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Standard Machines Increase Production

Savings Effected in Use of Fixtures Rather Than in Special Machines—Case of Quintupled Production

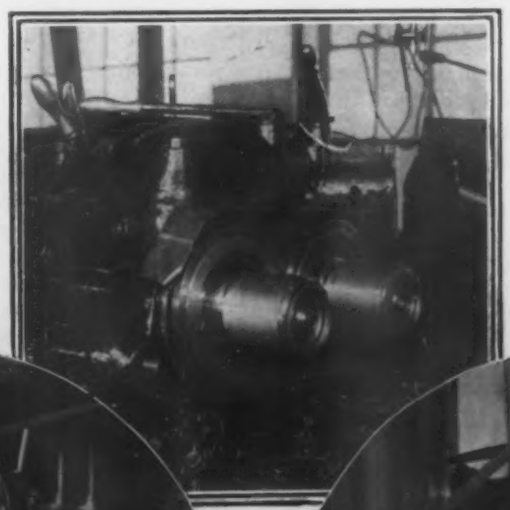
BY L. S. LOVE

CONSIDERABLE increase in production can very frequently be secured through the development of fixtures to be fitted to machines already in use in the machine shop, or through the purchase of standard types of machines to be fitted with special fixtures, or in many cases without any special fixtures at all, but simply with the use of commercial machines with standard tools fitted to them.

This is exemplified in the changes which have been made in the production plant layout at the Gray & Davis Division of the American Bosch Magneto Co., since the latter company took over the Gray & Davis plant at Cambridge, Mass. In this particular plant starting and lighting motors and generators for motor cars are manufactured. These motors and generators consist of shells or frames in which are mounted four poles and the usual form of laminated rotor with requisite connections.

There are two sizes of shells used in the present product, 4 in. in diameter and 5 in. These shells are drawn to shape from flat stock. The former method of drawing did not produce shells of sufficient accuracy to be used without boring. This operation, as well as opening of the closed end and chamfering the inside edge on that end was handled, on both sizes, in a single spindle automatic screw machine; the turning, beveling and shouldering operations being done in turret lathes.

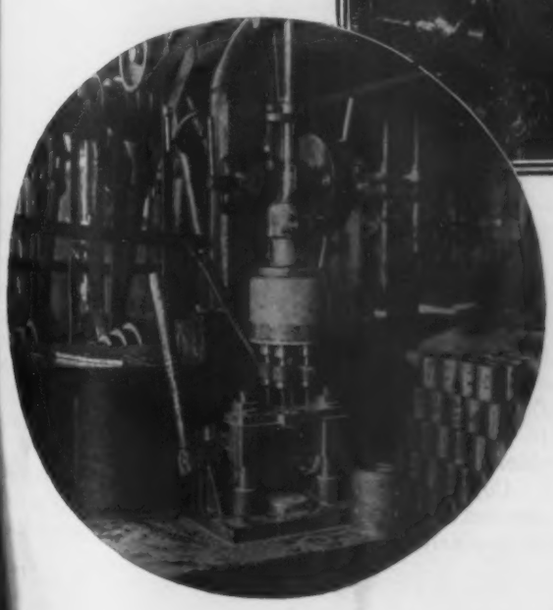
The present manner of production is the same

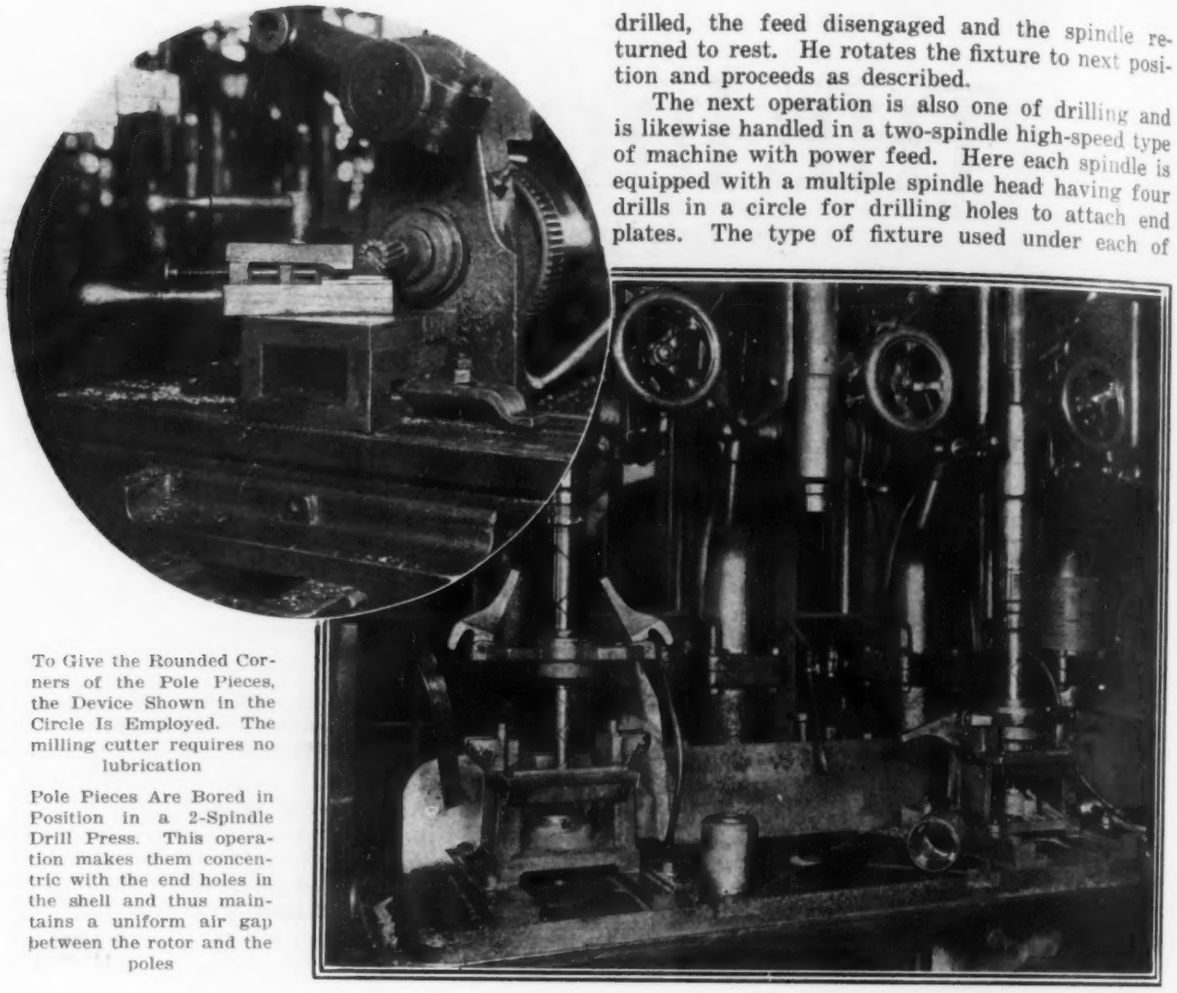


A 2-Spindle Turret Lathe Saves Two Chuckings of the Shell or Frame of an Automobile Starting and Lighting Motor (as Shown in the Top Illustration) in Turning, Shouldering and Boring the Shells

A Simple Quick Acting Fixture and Drill Guide for Drilling the Holes in the End Plates of the Motor Is Shown in the Lower Left Picture

In the Lower Right Is Shown the Method of Drilling Pole Pieces, to Be Fixed, of Course, on the Interior of the Motor Shell. The method increased output five times





To Give the Rounded Corners of the Pole Pieces, the Device Shown in the Circle Is Employed. The milling cutter requires no lubrication

Pole Pieces Are Bored in Position in a 2-Spindle Drill Press. This operation makes them concentric with the end holes in the shell and thus maintains a uniform air gap between the rotor and the poles

on the 4-in. shells, except that the boring operation is eliminated, the opening up of the closed end being the operation now on the automatic screw machine. The boring operation is no longer required, as the drawing dies are held to closer limits, thereby producing shells of sufficient accuracy without that machining operation. In handling the 5-in. shells it has been found more economical to place the work in a standard type of two-spindle turret lathe. This machine is equipped with standard forms of tools having stellite bits, which are doing all machining operations of opening, chamfering, turning, shouldering and beveling in one chucking at the rate of 225 per day, which is a saving of 20 per cent from the old method. The expanding mandrels on which the work is mounted are controlled by air. This mounting is shown in one of the illustrations.

After the shells are turned in the manner just described, they are moved to the next machining operation. This is drilling holes through the sides for attaching the pole pieces and brush holders. There are three holes in a straight line parallel with the axis of the shell, each line of holes being drilled radially and spaced 90 deg. apart. The work is handled in a two-spindle power-feed drill press of the high-speed type. Each spindle carries a multiple drill head carrying three twist drills in a line. Shells are mounted on fixtures consisting of a horizontal expanding mandrel, which can be rotated and locked in the four positions required for spacing around the shell. Drill guide bushings are carried in a plate extending over the mandrel. The method of handling is for the operator to place the work in one fixture and engage the feed. He then mounts a piece in the other fixture and engages the feed there, during which interval the first piece has been drilled, the feed disengaged and the spindle returned to rest. He rotates the fixture to next position and proceeds as described.

The next operation is also one of drilling and is likewise handled in a two-spindle high-speed type of machine with power feed. Here each spindle is equipped with a multiple spindle head having four drills in a circle for drilling holes to attach end plates. The type of fixture used under each of these spindles consists of a heavy base in which are mounted two vertical guide posts. On these posts slides the top clamping plate, which serves not only to hold the work, but also carries drill guide bushings. The work is mounted on a plug in the base plate, which enters the open end of the shell. There are two dowel pins at the rear which enter two of the pole piece holes previously drilled, thus registering it in relation to these holes. The top clamping plate also carries a pilot plug which enters the shell at the top. It is thus registered from three points—both ends and the side. The top plate of this fixture is lowered by means of a lever actuating a shaft on which are carried two gears. These latter mesh with racks attached to the rear of the top plate bearings which ride on the guide posts, as illustrated in another of the reproduced photographs. The tapping of these four holes for attaching the end plate is done in a similar manner in a machine equipped, of course, with a tapping attachment.

Alligator Shear Leaves Insignificant Burr

Pole pieces are delivered to the shop in bars of mill lengths drawn to shape. These must be cut to the individual length required. The former method was to bundle four or five bars together and cut then in a hack saw. This work is now being done one bar at a time in an alligator shear about twenty times as fast as the old method, and the shear cuts this stock with practically square ends. In addition to the saving of time, there is a considerable item of saving in floor space.

Copper segments for commutators are likewise sheared from formed bars, instead of being sawed as formerly. This method produces 11,000 per day

as against a former production of 1000 per day per saw. This operation is handled in an ordinary punching press.

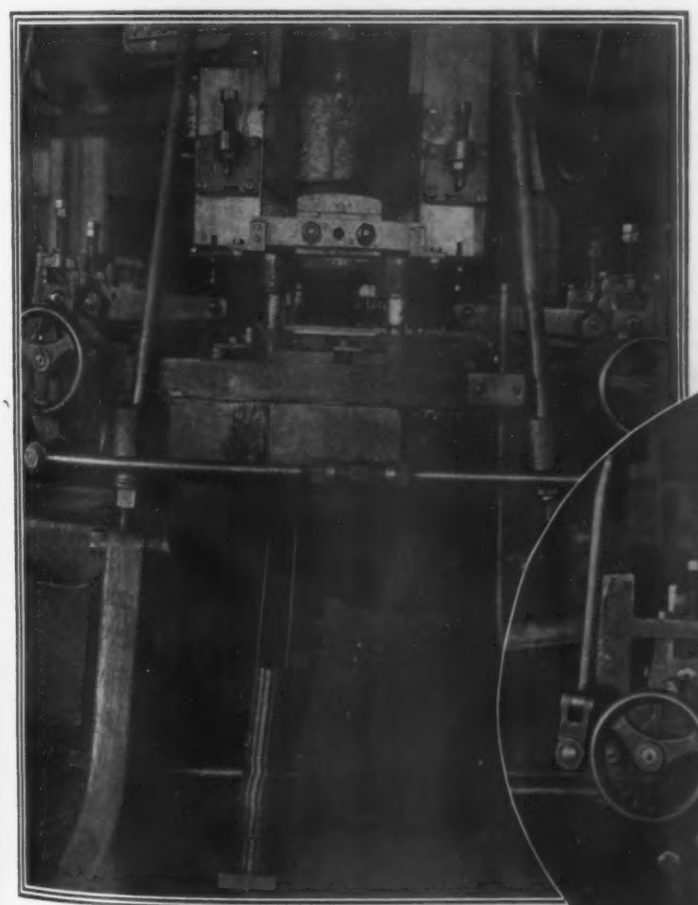
Each pole piece has two holes drilled in it for attachment to the shell. These were formerly handled in a single spindle machine, with hand feed, one hole at a time. The output was 1000 per day. The present method utilizes a two-spindle high-speed drill press with automatic feed. Table is equipped with two fixtures, one under each spindle as shown in an accompanying illustration. There is a two-spindle head carried in each spindle of the machine. Operator inserts a piece in one fixture and engages the feed, then proceeds to the other fixture and inserts work there, engaging the feed. He then returns to the first spindle which has drilled the holes in the first piece, disengaged the feed and returned to neutral position. This method permits practically continuous operation with a production of 5000 drilled pieces per day.

Another operation required on the pole pieces is rounding the corners to prevent abrasion of insulation on the pole winding. This work was formerly done by holding the pieces against a grinding wheel. At present the pieces are mounted in a fixture on an ordinary knee type milling machine, in the spindle of which is a shell end milling cutter. The fixture swivels at a point which produces the desired radius at the corner, as the pole piece is swung in front of the tool. Work is ejected by the operator's hand pushing against a spring plunger, as illustrated. Some 500 pieces with four corners rounded are turned out daily without the use of any cutting compound, the cutter keeping cool by running in the air for a period greater than the actual cutting time.

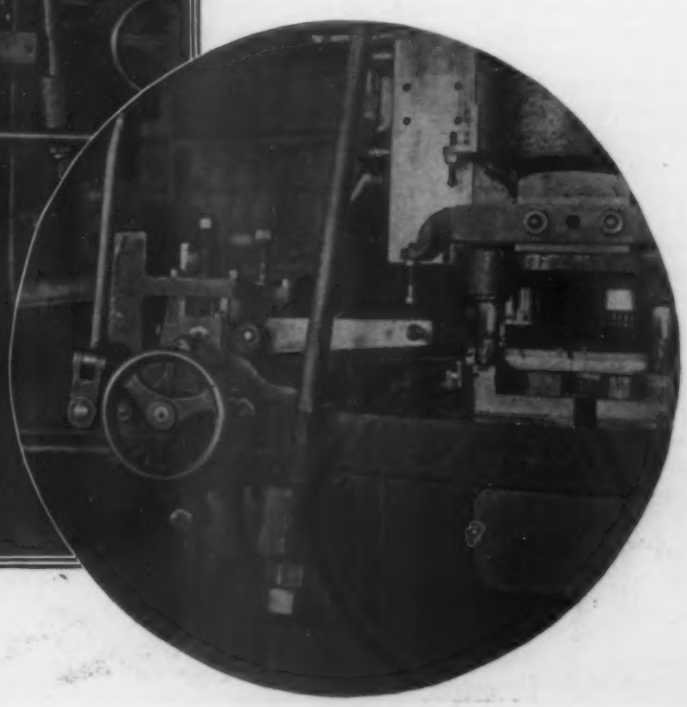
The pole pieces are next assembled in the shell and are carried to a boring operation, that they may be concentric with the end holes of the shell. This work is handled in a two-spindle power-feed drill press, of the plain bearing type, on the table of which are two fixtures, both handled by one operator. As indicated in one of the illustrations, the base plate of the fixture carries a pilot which registers one end hole, the top plate when clamped down registering the other end hole on a pilot plug carried there. The top plate and the lower plate both carry bushings to pilot the boring bar.

Seats for bearings, laminated cores, etc., are turned on the rotor shafts. These are made from bar stock and were formerly produced on single spindle automatic screw machines. The present method employs practically the same kind of tool set-up, except that the work is handled in a four-spindle automatic machine, increasing the production three times from the same floor space.

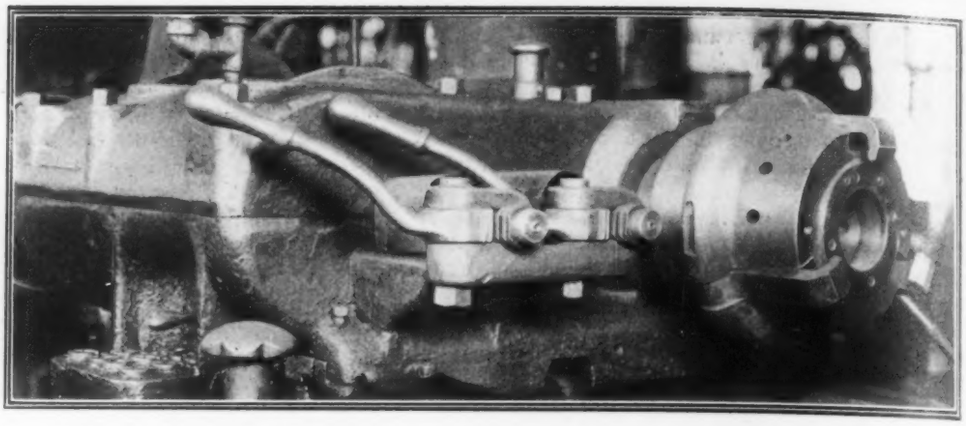
A special form of three-jaw chuck, also illustrated, has been designed for use on turret lathes. The jaws on this chuck are levers pivoted in the body and have hooked ends. They rock in to grip the work. They are actuated by a tapered plug which enters the body of the chuck at the rear and pushes out on the jaws behind their pivots, thus closing them in at the front. Starter gear housings are held for turning and boring in this chuck with a saving of 35 per cent over time required with the old standard chuck. The machine in which this operation is performed is provided with air to



By Using a Two-Stage Die of High-Speed Alloy Steel for Making Laminations, Production Was Increased. The laminations are stacked on two wires, as indicated in the cut to the left, ready for assembly



The Scrap After the Laminations Are Cut Is Dropped Into a Barrel Located at the Left of the Machine and the Cutting Into Pieces Requires No Baling



By Using This Chuck 35 Per Cent in Time Was Saved in Turning Starter Gear Housings

operate the chuck. One end of the housing is inserted in the open face of the chuck as far as the flange on the housing. The jaws of the chuck then rock, in gripping the piece and drawing it firmly back against the chuck face. thus holding the bore square with the flange.

This type of chuck is used on several other operations, in some cases being lever operated instead of air operated. One operation is the facing on both sides of the motor end plate flange. This chuck, while similarly constructed, grips internally. Two turning tools, set the proper distance apart, are carried in the front tool post on the cross slide of the turret lathe and fed in to rough the flange parallel. Two tools carried in the rear tool post are then fed in to finish face the flange parallel and to the proper thickness.

Standard Tool Gives Better Production Than Special

Starter pinion teeth are chamfered to facilitate engagement with the starter gear. This work was formerly handled in a tooth-rounding machine at the rate of 200 per day. The present method employs an ordinary hand-milling machine on which is counted a hand-operated fixture. This fixture is provided with a spring latch pin for proper indexing of the gear and has increased the output to 100 per hour.

The stampings which make up the laminated rotor core were formerly stamped out in a press with a single operation die fed by hand. Per day 20,000 pieces were punched. The company is now producing 45,000 pieces per day by using roller feed and a two-stage die made of high-speed alloy. The first part of the die cuts out the winding slots and punches the hole through which the shaft passes. The second position in the die blanks the lamination out of the strip and drops it through the die and press bed to a stacking frame. This frame consists essentially of two upright rods set into a heavy base. The rods extend up into the die and catch the laminations as they come through, thus stacking them ready for use.

Since developing this type of die and stacking frame, a further indirect saving of labor has been effected in handling the scrap. Formerly it came out in strips and was bundled. A new roller feed has been built with a shearing attachment, which, acting with the press operation, cuts the strip scrap into small pieces and drops them into a conveniently placed barrel.

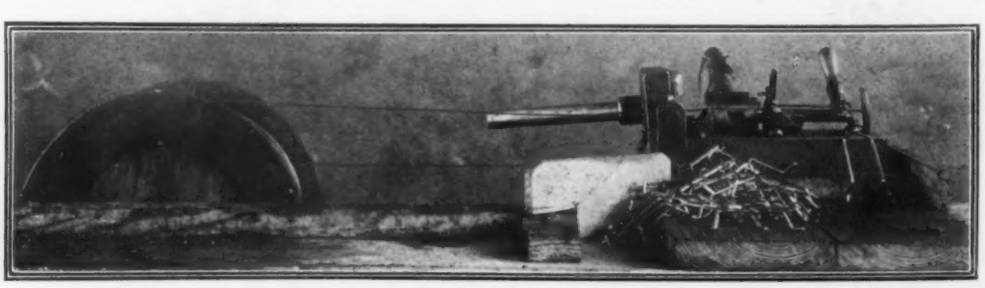
Rotor shafts before receiving the core laminations are knurled in a special machine, similar in appearance to an ordinary beading machine, except for the rolls. These are cut for knurls. The two lower rolls are 3 in. in diameter and are cylindrical. The top roll is 5 in. in diameter and is flatted on one side to permit of convenient insertion of the shaft, one revolution of the top roll cutting the knurl.

A hand-operated forming machine is used for forming rotor windings. Flat wire is drawn from the reel into the forming machine. By the operation of a locking pin and lever the wire is folded back, thus forming the two legs of the winding. It is then gripped on both legs and formed by the movement of a second lever. A third lever sets the ends and cuts off. This operation is handled at rate of 6000 to 7000 per day per man. The company has just worked out a machine for producing 2000 per hour. This machine will be installed shortly.

The field coils or windings which surround the pole pieces are wound in an old turret lathe from which all parts but the bed and head have been stripped. Wire which is cut to proper length is fed to a slot in the special chuck carried on the spindle of the lathe. This chuck is a sort of mandrel formed to correspond to the shape of the pole piece. As the lathe spindle revolves, the wire is held against the mandrel by a roller rest supported by a spring. The coils are then wrapped in insulating material and passed through a press operation to form them to the contour of the motor shell.

Another special machine which this company has developed winds 1600 turns on relay shunt coils. While this machine is not radically different in appearance from standard commercial winding machines, it has been possible nevertheless to produce with it about 50 per cent more work.

During the past few months the Dominion Iron & Steel Co., Sydney, N. S., has been importing Algerian iron ore from Northern Africa. This when mixed with the Wabana ore, is said to produce a grade of foundry iron which far surpasses that previously made by the company from Wabana ore alone.



Rotor Windings Are Formed in a Hand Machine

How Bethlehem Became Armament Maker

Reminiscences Covering the Introduction of Bessemer Steel, the Activities of Ericsson, Holley and Fritz and the Passing of the Builder of the Monitor

BY H. F. J. PORTER

IN 1842 Robert L. Stevens, of Hoboken, N. J., began the construction of a floating battery, which when finished he offered to sell to the Government; but the Navy Board appointed to inspect it made an unfavorable report upon it and it was not accepted. Robert L. Stevens died in 1859 and his brother, Edwin A., decided to reconstruct it. In 1862, discouraged because Capt. Ericsson at the DeLamater Iron Works, New York, outdistanced him with the Monitor, he sent to Europe Alexander L. Holley, a very capable civil engineer in his employ on the Camden & Amboy Railroad, (in which his family's fortune was invested and of which he was president), to study the foreign navies, shipyards and armament forges in the hope of obtaining some new ideas to apply to his rejected battery.

Country's First Bessemer Plant

While in England Holley seized the opportunity to investigate the Bessemer process of making steel, then recently developed, and on his return, after reporting to Mr. Stevens on the ordnance situation, he visited Captain Ericsson, who he knew would be interested in learning about his trip, as he was then engaged in conjunction with his "Battery Associates," John F. Winslow and John A. Griswold, iron manufacturers of Troy, N. Y., in building monitors of various sizes for the Government at the DeLamater Iron Works and in a number of other shipyards about the country. Incidentally Holley told him what he had learned about the Bessemer process and Winslow and Griswold at once sent him back to England to secure the exclusive rights for its adoption in this country.

On Holley's return he formed the partnership of Winslow, Griswold and Holley, and in 1864 built the first Bessemer steel plant in this country in connection with the Albany Iron Works at Troy, N. Y., under the name of the Bessemer Steel Co.

Shortly before this there had been established at Wyandotte, Mich., an experimental plant of a similar character under the patents of William Kelly, of Eddyville, Ky., and of Robert Mushet, of England, the American rights to whose patents had been secured in this country.

The Bessemer process and the Kelly process interests soon locked horns in the courts but finally concluded to settle their differences by combining under the name of the Pneumatic Steel Association. The plant at Wyandotte was discontinued and Capt. Robert W. Hunt, who had charge of it later, became superintendent of the works at Troy. They then began the introduction of the Bessemer process of making steel in the representative iron rolling mills of the country, most of which were in western Pennsylvania, Ohio and Illinois, where the necessary raw materials for the product, iron ore, limestone and coking coal, were located. Mr. Holley acted as engineer of installation.

Up to this time railroad building had been slow owing to the high price of wrought iron rails and transportation about the country was largely by stages and river boats. Manufacturing was carried on by water power, and even when the steam engine became commercialized, industrial towns were still located on the rivers, lakes and the coast because of the lack of land transportation facilities. The Bessemer process, however, substituted the cheap steel rail, and immediately there came about an era of railroad building which carried the factory site to the raw material, and industrial towns sprang up all over the country.

It has been said that the Bessemer process did more for civilization than all previous inventions of man put together. Holley deserves much of the credit for this advance. He made trips abroad annually, exchanging between European and American Bessemer plants experiences and improvements in practice, many of which were of his own devising.

Early Warship Work at DeLamater Plant

In 1868 when Edwin A. Stevens died, he left a million dollars to the State of New Jersey to complete his floating battery. In 1869 Theodore F. Randolph, a prominent business man in New Jersey, president of the Morris & Essex Railroad and interested in coal and iron mining in Pennsylvania, had been elected Governor of the State and he appointed my father, Gen. Fitz John Porter, who had become associated with him after the Civil War and lived on adjoining property in Morristown, and Gen. George B. McClellan and William Shippen, who was connected by marriage with the Stevens family, as commissioners to reconstruct the Stevens' battery. They selected Isaac Newton, U. S. N., retired, who had been first assistant engineer on the Monitor during her career, to superintend the work, which was contracted for by the DeLamater Iron Works.

In connection with his mining associations, my father had come in contact with Asa Packer, at Mauch Chunk, Pa., who built the Lehigh Valley Railroad and in 1865 founded Lehigh University at South Bethlehem, Pa. He had placed in charge of it Capt. Henry Coppee, then professor of English literature at the University of Pennsylvania. Professor Coppee and my father had been classmates at West Point and had gone through the Mexican War together, and several of his faculty were West Point men. When it came time for me to attend college in 1874 and I decided to study engineering, it was quite natural for my father to select Lehigh University as the technical school for me which he knew most about and of which there were very few in existence and all quite young.

In that same year Alexander Holley installed the Bessemer process at the Bethlehem Iron Works at South Bethlehem, and in October, one month after I went there, the first "blow" was made and the town went to see it. Governor Randolph's eldest son, a boyhood friend of mine, went to South Bethlehem at the same time I did and entered the iron works to obtain an idea of the iron and steel industry before joining his father in his coal, iron and affiliated interests. He and D. A. Tompkins, chief draftsman of the works, roomed together near me and I visited them there and at the works frequently during my college course and so obtained some familiarity with shop practices.

It was during those visits that I met and got to know more or less intimately Mr. Holley and John Fritz, superintendent and engineer of the plant. They used to talk about the inadequate protection of this country from the attacks of foreign navies, which were growing stronger every year, and Holley told Fritz of Captain Ericsson's work and of his own visits to the foreign ordnance forges. He brought Fritz and Ericsson together at the DeLamater Iron Works, where much of the machinery for the Bessemer plants was constructed.

Mr. Holley wanted Mr. Fritz to install a type of blowing engine designed by George H. Reynolds, chief engineer of the DeLamater Iron Works, and he took Mr. Fritz there to see it, but Mr. Fritz preferred engines of his own design and I saw them built and erected and chose one of them as the subject of my graduating thesis at Lehigh University in 1878.

It was customary in those days for a boy after graduating as an engineer to complete his preparatory

education by spending four years getting practical experience in some iron works, and both Mr. Fritz and Mr. Holley suggested my going to the DeLamater Iron Works, which was the largest works of its kind in the country and where a greater variety of work was performed than elsewhere.

Beginning of Society of Mechanical Engineers

My father, who had become acquainted with Mr. DeLamater and Captain Ericsson, and the DeLamater Iron Works through his connection with the rebuilding of the Stevens battery, approved of the suggestion, and I went there in the summer of 1878 and spent four years in the shops, beginning in the pattern office and ending in the drafting room. Looking upon this experience as a post-graduate course I considered the DeLamater Iron Works as my Alter-Alma Mater. There I used to see Mr. Holley on his occasional visits to Mr. DeLamater, and on one of these visits he came to my drafting board, which was just outside of Mr. DeLamater's office, and expressed his interest in learning that I was in charge of that part of the drafting department which had in hand the development of ice machinery, which was then new in this country, having been introduced here by Raoul Pictet in the French section of the Centennial Exhibition in Philadelphia in 1876 and taken up afterward by Mr. DeLamater.

Mr. Holley told me of the then forming American Society of Mechanical Engineers, of which he was the founder and suggested my joining it and presenting a paper before it on the ice machine. I accepted the suggestion and joined the society at its first meeting in November, 1880, and at the following spring meeting in Hartford, Conn., I read a paper before it on the experimental ice machine plant at the DeLamater Works. Mr. Holley attended this meeting and presided at the banquet held during one of the evenings.

While in the shops at the DeLamater Works, I took part in the construction of the "Destroyer," a semi-submersible torpedo boat designed by Captain Ericsson to supersede the Monitor type of war vessel and built at his and Mr. DeLamater's expense. On its trial trip, I met Lieutenant William H. Jaques, a naval officer in the Bureau of Ordnance, who wrote a monograph on it entitled "Ericsson's Destroyer and Submarine Gun" which was published by G. P. Putnam's Sons as No. xxx in their series "Questions of the Day."

The Semi-submersible Torpedo Boat

This vessel the owners offered to sell to the Government and the latter appointed a board of three naval officers with Capt. T. O. Selfridge at its head to inspect it. It was sent to the Brooklyn Navy Yard and submitted to a series of tests resulting in a favorable report and recommendation that it be purchased and several more ordered built.

The novelty of the design deterred the Government from taking immediate action regarding it, just as they had acted in the case of the Monitor, but the activity of foreign nations in increasing their navies caused the appointment of another board entitled the Naval Advisory Board, composed of fourteen army and navy officers, to recommend a comprehensive plan of procedure regarding the development of a new navy. The president of this board was Admiral John Rogers, who had commanded the monitor Dictator built at the DeLamater Works.

The introduction of Bessemer steel in the principal rolling mills of the country naturally caused this board, among other recommendations, to propose that the new navy should be constructed of steel and naturally to confer with Captain Ericsson and Mr. Holley in the course of the study. The recommendation resulted in the appointment of the "gun foundry board" composed of three army and three navy officers with Commodore Edward Simpson, chairman, and Lieutenant Jaques, previously mentioned, secretary.

Armor Plate and Guns at Bethlehem

Both Captain Ericsson and Mr. Holley recommended that before making their report, they take the same trip to Europe which Mr. Holley had made and visit the armor plate and gun forges of England and on the continent. This recommendation they adopted and on their return home, Lieutenant Jaques had with him options on the licenses from Whitworth in England and Schneider in France for the exclusive use in this country of their processes for making armor plate and guns. These were offered to Mr. DeLamater, but he said he was too old to consider them and contemplating retirement rather than engaging in new ventures. Mr. Holley had died while the board was away and Captain Ericsson recommended that they visit Mr. Fritz at Bethlehem as the best man to take up the project.

Mr. Fritz had already realized that he could not compete with the other Bessemer plants in the West, which were more favorably located as regards the raw materials of the product. From his knowledge of the manufacture of ordnance obtained from Holley and Ericsson, he saw also that by a change to the latter character of product he could sell a small amount of it in the shape of guns and armor plate for hundreds of dollars per ton instead of a large amount in the shape of rails for tens of dollars per ton. He had already placed the matter before his board of directors, explaining that by this change the distance of the plant from the raw material would not be so serious a matter. So when the gun foundry board came to see him and Lieutenant Jaques showed him the options on the licenses to use the foreign processes of manufacturing ordnance, he induced the board of directors to take up the matter with the Government at Washington. Receiving favorable consideration there, Mr. Fritz and Lieutenant Jaques went abroad and closed the contracts with Whitworth and Schneider, while simultaneous arrangements were made with the Government here for sufficient orders to guarantee the construction of the works. The works were completed in 1887 and Lieutenant Jaques left the navy and joined the staff of the company.

Mr. DeLamater and Captain Ericsson died in 1889 and the DeLamater Iron Works went out of existence the following year. The site was bought by New York, the buildings razed, the west side marginal way was cut through and modern piers for ocean vessels were built there. The Bethlehem plant already in full operation thus became the logical successor of the DeLamater Works.

While I was a student at Lehigh University 1874-78, the Centennial Exhibition took place in Philadelphia. Armed with letters of introduction to some of the officials, I visited the exhibition under very favorable circumstances. A letter to Lieutenant Lewis W. Robinson, U. S. N., in charge of machinery hall, from the prominent Philadelphia engineer Coleman Sellers, whom I knew well through college friendship with his youngest son, gave me especially favorable opportunity to study the exhibits there, which Lieutenant Robinson took occasion to go out of his way to show me.

Armor Plate and Commercial Forgings Exhibited at Chicago

In 1891 I was appointed first assistant mechanical engineer at the World's Columbian Exposition in Chicago and took part in it during the construction period under D. H. Burnham, the Chicago architect, then director of works. The chief of the machinery department was my old acquaintance of the Centennial Exhibition, Lieutenant Robinson, who when the construction of the exposition was approaching completion invited me to become assistant chief in charge of machinery hall. So I was able to assist Mr. Fritz and the Bethlehem Iron Co. in securing adequate space for their exhibit of armor plate, guns and large commercial forgings.

After the exposition, I decided to open an office in Chicago and the Bethlehem Iron Co. made me Western representative to handle commercial work.

At this time there was formed in Chicago the Technical Club, composed of engineers and others affiliated with that profession. Capt. Robert W. Hunt, who, as has been stated, was in charge of the Bessemer Steel Co.'s plant at Troy, N. Y., and had later established an international bureau for testing rails and materials of construction, became president of the club. Charles E. Billin (now secretary of the Philadelphia Engineers' Club) became secretary and I became treasurer. This club later developed into the present Chicago Engi-

neers' Club, one of the largest social organizations of the profession in the West.

During the 90's a great development of electricity in the lighting and street railroad fields took place and huge power plants with their large steam engines were made possible only by the great forging presses of the Bethlehem Iron Co. When the Spanish war came on, as the company in accordance with the contract with the Government had to devote its whole energy to the production of ordnance to the exclusion of commercial work, I was called to the works at South Bethlehem and there I was able to renew my association with Mr. Fritz and Lieutenant Jaques.

Historical Landmarks Established

After the DeLamater Works closed down, many of the men who worked there, anxious to maintain their old associations formed an organization called the "Associated Veterans of the DeLamater Iron Works." This still exists, meeting annually at a banquet. During the past four years this organization has had several meetings memorializing the work of Captain Ericsson and Mr. DeLamater in which quite a large number of other organizations civic, historical, technical, etc., have taken part. I have been chairman of the committee in charge of these meetings and at the last one, on March 9, the sixtieth anniversary of the battle between the Monitor and the Merrimac, I had the satisfaction of having the site of the DeLamater Iron Works, Twelfth to Fourteenth Streets and Tenth Avenue to the North River, New York, named DeLamater Square and a bronze tablet recounting the accomplishments performed there placed on the Cunard pier, which now occupies the space where the center of the old works was. I was thus instrumental in perpetuating the name of my Alter-Alma Mater in the locality where it was rapidly fading from memory.

This committee is now arranging to place a historical collection of the DeLamater-Bethlehem memorabilia in the Smithsonian Institution at Washington as the nucleus of a national engineering museum in which every engineer in the country should be interested.

We are told that a tree once marked retains the evidence, though a hundred years of growth may have overlaid it. We cannot foretell the future of the stately oak of American engineering planted during the middle of the nineteenth century on the threshold of a development which has placed this country in the forefront of all the others, but no time will come when the historian stripping off the bark and penetrating the rings of many generations will not find at the heart the names which were carved there by Captain John Ericsson, Alexander L. Holley, Lieutenant William H. Jaques and John Fritz.

WHY WAGES WERE RAISED

An Answer from the Experience of New England Brass Mills

It will be recalled that some criticism was made of the 20 per cent advance in wages at steel works that became effective Oct. 1. It seemed to be the view in some quarters that the steel producers made the position of manufacturers in other lines more difficult, and needlessly so. The fact was, as has been pointed out by THE IRON AGE, that the steel manufacturers, in view of the relation of supply and demand, in the market for common labor, had no option in respect to the advance. It was really made by conditions over which they had no control. The article below, reproduced from the *Chase Diamond*, the publication of the Chase Companies, Inc., Waterbury, Conn., shows exactly the same situation in the brass industries that compelled the action on the wages of steel workers:

"Two months ago there was an increase in wages in the Chase Metal Works, the Chase Rolling Mills, and the Waterbury Mfg. Co., and various guesses have been made as to why wages went up.

"There has been no general demand for higher pay, there has been no talk of strikes. There is little radicalism or bolshevism in Waterbury, and although there never was, and probably never will be, a time when every one feels that he is earning as much money as he would like, still men were not so discontented or restless.

"Why, then, did wages go up?

"Had the companies made so much money that they felt that they ought to divide some of the profit among their employees?

"Was another golden age of higher wages and prosperity about to come?

"Were profits large and business so plentiful that wages were raised as a kind of bonus?

"No; none of these reasons was correct. Wages went up for two reasons:

"1. There was a shortage of unskilled labor.

"2. Living costs were slowly rising.

"The brass business has been in hard times. Last year one brass company lost a million and a half dollars, another lost nearly a million dollars, and another about three-quarters of a million, and other brass mills and factories have suffered in the same way. Business has been "bad" for nearly two years. People did not buy brass and the factories were almost idle. Thousands of men were out of work and the millions of dollars invested in brass and machinery stood idle. Taxes and overhead charges piled up and every month showed large losses on the ledgers.

"Then slowly, like a sick man after a long illness, business began to get back its strength. The factories began to hire more men to take care of their increased business, but the demand for men found little response. The long lines of unemployed that besieged the mills for work last winter had disappeared. Many had gone to other cities, many had returned to Europe. Strict immigration laws were in force and the supply of immigrants had dwindled to a thin stream. The building boom had come with a rush and many were on new construction work and repairing the roads.

"Men for heavy unskilled labor were scarce.

"There was also another reason for the increase in wages. Living costs began to climb. The coal strike will be paid for by every man in the country this next winter, and the railroad workers' strike has cost the country millions and millions of dollars, every dollar of which will sooner or later be paid for by the public.

"There is, however, one side of the recent raise which has not been talked about, but which is easily seen to be true. That is, that the companies which have raised the pay of their employees at this time will suffer large losses from doing so.

"Contracts have been taken to insure steady regular business for our mills and factory, and these contracts have been taken at old costs. A piece of brass, for instance, may cost 20c. per lb. to make, on which we may be sure of a fair profit. Add to this price the increased cost of this raise in wages, and the profit is eaten up, and the article sold at a loss.

"Our customers who have already placed their orders may congratulate themselves, our men may appreciate that what is our loss is their gain, but we ourselves know that unless this raise is repaid by more effort and productive labor, it means a large expense and loss to our companies."

"Daylight the Natural Illuminant" is the title of a book of 48 pages published by the Skybryte Co., Cleveland. From the premise that the intensities of artificial light in use in most factories are too low for the workman to do his best, the author argues that by providing adequate glass areas and by keeping the glass clean, natural lighting will have a chance to save workers as assets instead of making them liabilities. He contends that daylight can easily provide the desired intensities and that with proper maintenance of glass, much higher intensities can be obtained than are commonly found in factories. The book will be sent on application to the publisher, 347 Bangor Building, Cleveland.

Continuous Annealing Furnaces for Sheets

Car-Type Furnaces with Daily Capacity of 125 Tons Each at Ashtabula Steel Plant—Pulverized Coal Used as Fuel

CONTINUOUS annealing furnaces for box annealing form the predominating feature of the new sheet mill plant of the Ashtabula Steel Co., Ashtabula, Ohio, this being the first installation of furnaces of that type for box annealing. Departing from the usual practice of having a separate annealing department with a battery of standard type annealing furnaces, usually located in another building at some distance from the mill department, the box annealing is done in two large underfired car-type continuous furnaces that, built as a pair, are located in the center bay of the plant, just below the sheet mills and adjoining the pickling, galvanizing and finishing departments. These furnaces have a capacity for box annealing the entire product of the eight-sheet-mill plant, or approximately 250 tons per day.

Various economies in production are claimed for these furnaces, particularly in handling. After the sheets leave the rolls the handling is confined to a comparatively limited area in the lower end of the plant. Another advantage claimed is that with the continuous furnaces the plant is always able to turn out without delay orders calling for quick delivery. With the elimination of a separate building for an annealing department, the entire production department is confined to the one main building 624 ft. long and 166 ft. wide.

Powdered coal is used exclusively for fuel throughout the plant, for the sheet and pair and annealing furnaces, for firing the boilers and also for the galvanizing pots. While powdered coal has been used for some time in sheet mills having separate sheet and pair furnaces, it is stated that this is the first plant in which this fuel is used for firing combination furnaces. Both the annealing furnaces and the coal pulverizing plant were furnished by the Fuller Engineering Co.

The annealing furnaces are 96 ft. long and, together, 23 ft. 5 in. wide outside the brick work. Each furnace is 6 ft. 3 in. wide between the bridge walls and 10 ft. 3 in. in height. Each is divided into two sections by a door in the center, providing two chambers of equal size, an annealing chamber on the charging side and a cooling chamber at the discharging end. Each furnace has a capacity for six annealing boxes, three in the annealing side and three in the cooling side.

All annealing pot covers are of steel plate and the bottoms of cast iron. The pots are conveyed in and out of the furnaces on cars 16 ft. long and 6 ft. wide built by the Easton Car Co. Each car has six wheels, each wheel being mounted on a short shaft with two bearings so that, in case of warping, all the wheels will remain on the track. The annealing box bottoms when on the cars are 2 ft. 6 in. above the floor.

Cars are charged into the furnace by means of two pulleys and a cable, the latter attached to an overhead crane. As a car is pushed into the heating chamber it shoves the six cars already in the furnace forward a car length, bringing the last car outside at the discharge end. A car is charged into the furnace every 4 hr., so that with a furnace capacity of six cars the material stays in the furnaces 24 hr., one-half of this time being in the cooling chamber. The usual car charge is about 20 tons. The end doors of the furnaces, and the center door dividing the heating and cooling chambers, are of cast iron and are operated simultaneously by a 15-hp. motor connected to a line shaft.

After the annealing pot is removed from the car, at the discharge end of the furnaces, the crane picks up the car, the bottom always remaining on it, and carries it back to the front end of the furnace. When necessary the cars can be lifted with their loads. For convenience in handling they are provided with movable lifting beams, which, when not in use, are pushed in under the car platform out of the way. Only one spare car is required in the operation of the two furnaces.

Extending the length of the cooling chamber on each side are six 6-in. pipes with a 2½-in. corebuster inside, through which air for cooling is circulated, blast being supplied by a Buffalo Forge Co. blower located at the side of the furnace. Air passes from the blower to a header and from this to the cooling pipes and, after passing through the pipes, is discharged through the roof.

The plant is divided into three bays, the two outside bays being 50 ft. wide and the center bay 66 ft. A liberal amount of floor space is provided for all departments and the building is of good height, being 44 ft. 9 in. high at the sides and 66 ft. in the center, to the peak of the monitor roof. In the north bay are located the squaring shears, the finishing department and warehouse and shipping department. A depressed loading track runs the length of this bay along the outer wall. In the center bay are the sheet mills and annealing furnaces. The south bay is occupied by the bar shear, sheet and pair furnaces and pickling and galvanizing departments. The north bay is served by a 5-ton crane, the center bay by a 30-ton crane with 10-ton auxiliary and the south bay by two 10-ton cranes, all supplied by the Cleveland Crane & Engineering Co.

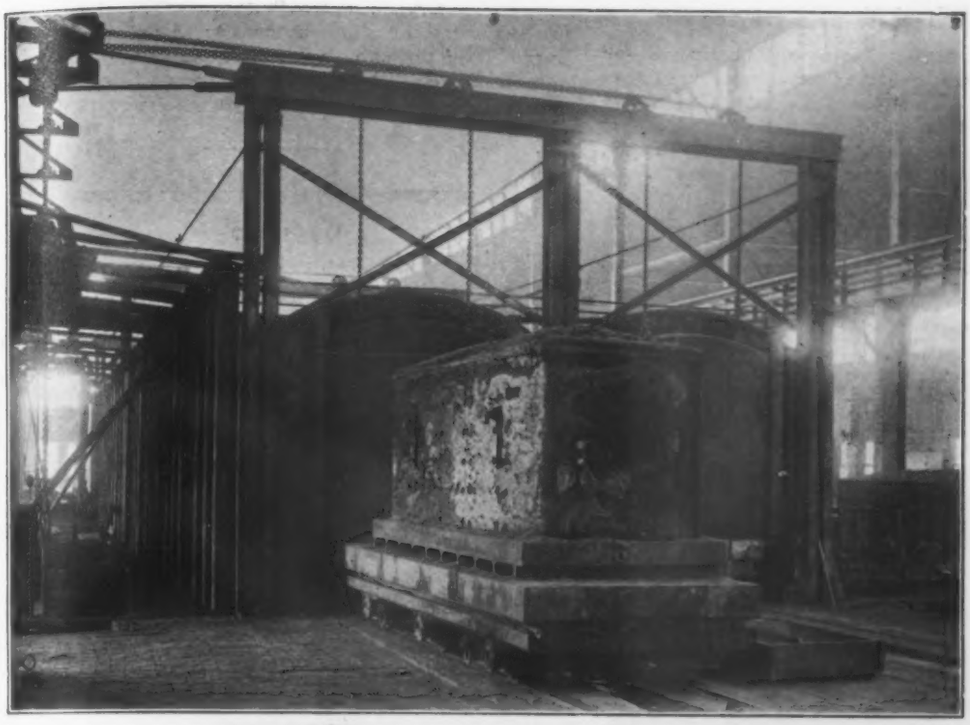
Mill equipment includes five roughing and eight finishing stands. The two largest finishing mills have individual roughing stands and the other six finishing mills have a roughing stand for a set of two finishing stands. The mills have 38-in., 42-in. and 46-in. rolls, all the rolls being 28-in. in diameter. Chilled rolls are used in the finishing mills. The mills were built by the Hyde Park Foundry & Machine Co. There are six 156-in. resquaring shears and four doublers, one for each two finishing mills, all of the same make.

Sheet bars which are stored in the upper end of the plant, are sheared on a bar shear built by the United Engineering & Foundry Co. This shear is served with a motor driven roller type approach table. After shearing, a crane in the south bay delivers the bars back of the furnaces. There are eight combination sheet and bar furnaces, one for each finishing mill. These are of the Fuller type with chambers 5 ft. 6 in. and 6 ft. wide and 25 ft. long. Bars are charged by hand into the pair furnaces from each side.

Equipment in the pickling, galvanizing and finishing departments includes two plunger type pickling machines with tanks 6 ft. deep and 13 ft. long, a drying machine, two galvanizing pots supplied by the United Engineering & Foundry Co., four roller levelers and a Streine corrugating machine.

The powdered coal plant is located at the side of the mill building. Coal delivered in hopper cars is dumped into a receiving header, from which it is conveyed to a crusher which reduces it to a size which will permit it to go through a 1-in. mesh screen. It is then elevated into a magnetic separator and is discharged into a 25-ton bin located at the feed end of a rotary drier, into which it is mechanically fed. After being dried until the moisture content is reduced to 1 per cent or less, it is elevated to two dry coal bins, one of 15 tons and the other of 8 tons capacity. From the bins it is fed into two pulverizers each having a capacity of 4 tons per hour. In these it is ground to a fineness that will permit 80 per cent to pass through a 200 mesh screen. From the pulverizers a Fuller-Kinyon pump delivers the fuel to two 7-ton weighing bins. After being weighed it passes by gravity to another pump

(*Concluded on page* 1362)



Annealing Plant of the Ashtabula Steel Co.

Two Continuous Annealing Furnaces of the Car Type, in Place of the Battery of Furnaces Commonly Found in a Sheet Mill. The car shown, with annealing box and bottom, is ready to be charged into the furnace

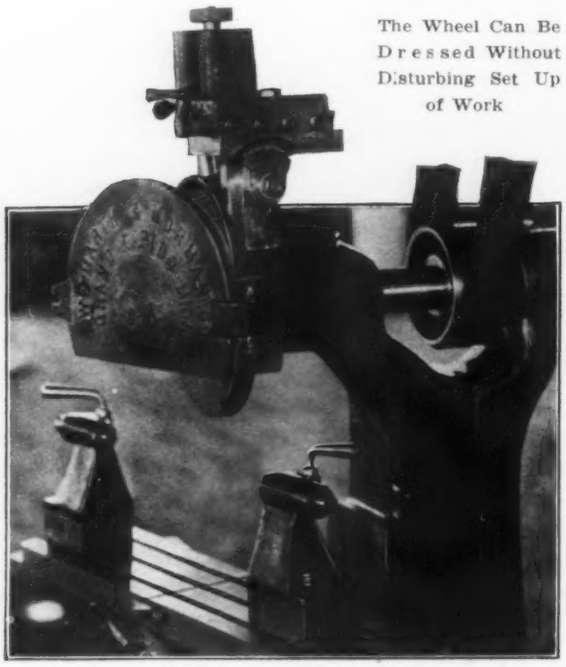
Discharge End of the Twin Annealing Furnaces, Showing Air Supply Lines Carried Over the Top and Extending Down Each Side of Each Furnace. The air is circulated on each side of the cooling chamber in the "lower" half of the furnaces

Hoppers, at Left, Which Supply Powdered Coal to the Sheet Furnaces and at Right, the Feed Lines Leading into the Backs of the Furnaces. The sheet bars, shown piled up, are delivered at the furnace backs by an overhead crane

Angular Wheel-Truing Device

An angular wheel-truing device as illustrated, for use with its surface grinding machines, has been brought out by the Wilmarth & Morman Co., Grand Rapids, Mich. It is intended for use in shops that salvage and reclaim worn out milling machine cutters, reamers and drills, and also in shops specializing in cast Stellite cutters and tools.

With this device, the wheel can be formed to correspond to the outline to be ground. In the illustration the wheel-truing device is shown in position for



The Wheel Can Be Dressed Without Disturbing Set Up of Work

dressing the wheel face parallel with the table. The diamond is fed to the wheel by means of the knurled knob at the top, which the crank is employed to feed the diamond across the face of the wheel. A graduated dial is provided for setting the device at the angle desired. The diamond-carrying member is tilted to either side for dressing the wheel face at an angle.

The chief advantage of the built-in wheel-truing device is that the wheel can be dressed properly without disturbing the set-up of the work. Time is said to be saved because of its adaptability and the facility of operation.

Merger of Press Manufacturers Reported

Newspapers at Toledo, Ohio, and elsewhere have published reports that the purchase of a controlling interest in the Toledo Machine & Tool Co., manufacturer of presses at Toledo, as reported in THE IRON AGE last week, is for the purpose of bringing about a consolidation of four or five of the leading press manufacturers in Ohio and Michigan. It is understood that a new corporation to be known as the Consolidated Machine Tool Co., will be formed with headquarters in Brooklyn, N. Y.

Nearly 60,000 Miles of Pipe in Oil Lines

A report of the Interstate Commerce Commission shows that in 1921 there were 55,260 miles of pipe line operated in interstate commerce by 33 companies. The total investment was put at $652,138,894. Extensive additions have been made to the system in the present year, and the American Petroleum Institute, New York, estimates that the 1922 report will show more than 60,000 miles of interstate line.

In addition to the main trunk lines, which are usually of 8-in. steel pipe and carry the oil from the producing fields to terminals located on the Atlantic and Gulf coasts and at the large listributing centers inland, there are thousands of miles of smaller so-called gathering lines. It is through these lines, which are from 2 to 6 in. in diameter, that the oil is collected from the wells and gathered in storage tanks for shipment to distant points.

Decarburization of Ferrochromium by Hydrogen

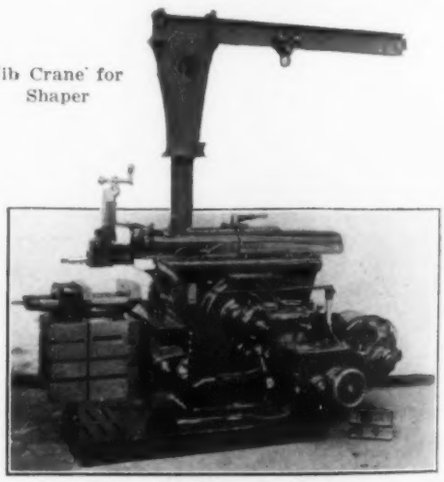
In order to produce rustless iron it is necessary that carbon-free iron and chromium be available. The usual forms of chromium, commercial grades of ferrochromium, contain comparatively large amounts of carbon. The discovery of rustless iron has thus made it very important to be able to treat ferrochromium by some process which will remove the carbon. Among the methods proposed is that of heating ferrochromium in contact with hydrogen.

Through experiments conducted by the Bureau of Standards, it has been found that ferrochromium heated in hydrogen loses carbon slowly at temperatures below the melting point of the alloy. When hydrogen is bubbled through molten ferrochromium, the loss in carbon is very rapid. It may be possible to prepare low carbon ferrochromium by blowing hydrogen gas through molten ferrochromium in a converter of the type used in the manufacture of Bessemer steel. This work is described in Scientific Paper No. 448.

Shaper Equipped with Jib Crane

To facilitate the handling of heavy work on its larger shaping machines, Gould & Eberhardt, Newark, N. J., have brought out the jib crane arranged as shown in the accompanying illustration. The equipment illustrated is the 32-in. direct motor drive machine having a jib crane of 1000 lb. capacity for loading and unloading work out of the vise. The crane is located opposite the operating side of the machine and may be revolved completely around it to handle work on all sides.

The boom is of single I-beam section and will take 1000 lb. at the extreme end. The mast is of heavy



Jib Crane for Shaper

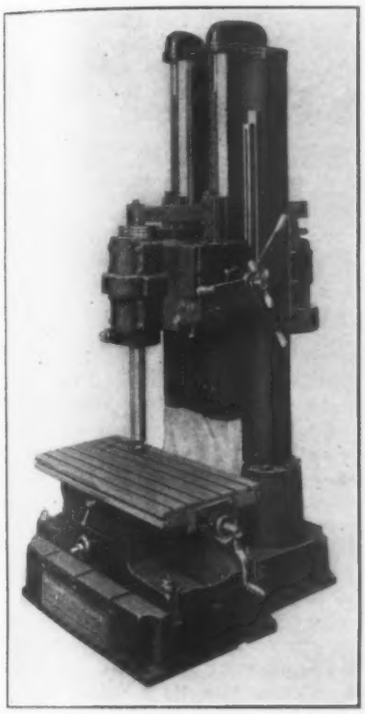
wrought steel pipe which is clamped to the shaper frame in two positions. The upper pintle is of steel and is held in a cup attached to the mast. It is provided with a ball and socket type bearing, intended to assure proper alinement of the boom at all times and permit revolving the crane by the application of a slight pressure.

The W. & B. Douglas Co., Middletown, Conn., pump manufacturer, has been purchased by the Premier Mfg. Co., Sandy Hook, Conn., which recently took over the Standard Metal Work Corporation, Thompsonville, Conn., automobile accessories, etc. Each of the subsidiary plants will be expanded within the next few months, if present plans carry.

Vertical-Spindle Type Cylinder Grinder

A cylinder-grinder having the wheel mounted on a vertical spindle as shown in the accompanying illustration, has been placed on the market by the Hy-Way Service Co., South Bend, Ind. One advantage of the vertical spindle arrangement is that the driving mechanism is above the grinding wheel so that abrasive dust drops through the cylinders and does not settle on the bearings and running parts. A canvas curtain is used to protect the vertical way on which the head slides.

The longitudinal table slide has sufficient movement in each direction from the center to permit of grinding three cylinders each way without uncovering the ways of the slide, which is intended to protect the ways from abrasive dust. In setting up a cylinder the bed on which the worktable is mounted is set in approximately the correct position to locate the work under the grinding wheel, the final adjustment being made by means of a cross slide controlled by a screw and crank.



Vertical Spindle Cylinder Grinder

A 2-hp. motor mounted at the back of the head serves to drive the grinding spindle, transmit the planetary motion to the spindle unit and feed the head down into the cylinder being ground and return it. It may be noted from the illustration that the motor is provided with a double end drive. The top belt is of fabric and drives the grinding spindle direct, and correct speeds for various sizes of wheels used are obtained through changing the pulleys on the motor and the spindle. The direct drive arrangement is intended to eliminate transmission losses and to permit of ample power from a 2-hp. motor.

The spindle is mounted in a sleeve which in turn is eccentrically located within another sleeve, the rotation of which gives planetary motion to the spindle. The outer sleeve has a ring bevel gear to which power is transmitted for rotating the wheel unit, independently of the rotation of the grinding spindle. The two sleeves in which the grinding spindle are mounted are arranged so that by making suitable adjustments, the eccentricity of the grinding spindle in relation to the entire spindle unit may be varied from zero to 1⅛ in. A graduated dial is provided to indicate the amount of eccentricity for a given setting. The range is ample for all commercial sizes of automotive cylinders where grinding wheels of suitable size are employed, without the necessity of changing pulleys.

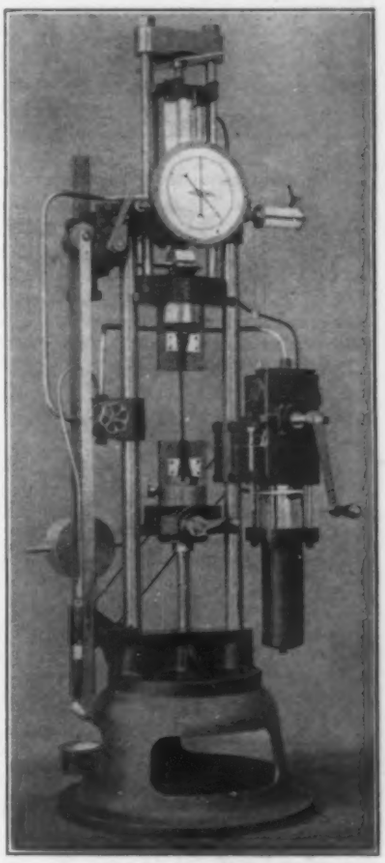
Power for the planetary movement of the grinding head is taken from a spiral pinion at the lower end of the motor through gears to the ring bevel gear on the spindle. By means of a hand lever, operating a clutch, speeds of either 40 or 60 revolutions for the planetary movement may be selected. Twelve rates of feed, from 0.007 to 0.375 in. per revolution of the grinding spindle are available, these changes being through gearing. The head is fed up and down on the column of the machine by means of racks and pinions, and the capstan wheel shown at the right is used in raising and lowering the head by hand.

The wheel spindle provided grinds holes 2¾ in. and larger, the speeds being 5000 to 7000 r.p.m. The grinding wheels are from 2½ to 5 in. in diameter. The range of feed of the head is 1½ to 10 in. per min. and the vertical travel of the head, 28 in. The equipment includes a truing diamond and holder. The floor space occupied is 37 x 42 in.; the height is 7 ft. overall; and the weight, with universal table and motor, is about 4000 lb.

New Tensile Testing Machine for Bars, Strips and Wire

A new tensile machine, built on the principle of the hydraulic press, has recently been put on the market. A feature is the wide range of adjustment which it permits as regards its sensitiveness and maximum capacity. Two coaxial rams are provided, and when both rams are in action, the machine can exert a maximum pull of 20,000 lb., while the maximum capacity with only the inner ram working amounts to 2000 lb.

The load is measured, as in all Amsler tensile testing machines, by a pendulum dynamometer, the most accurate method known for measuring the force exerted by testing machines. This pendulum deviates from its vertical position when pressure is applied, acting like a lever, but no knife edges, which are always subject to deterioration through shocks, excessive stresses, vibrations, etc., are employed. By adjusting the effective length of the pendulum rod, the sensitiveness of the dynamometer can be changed, and the 20,000 lb. machine can be converted in a minute into one with a maximum capacity of either 10,000 lb., 4000 lb., 2000 lb., 1000 lb., 400 lb. or 200 lb. Whatever the particular range chosen may be, the entire load indicating dial and the entire width of the load-extension recording apparatus will then be available for the maximum capacity for which the machine had been set. The selective feature of this machine is especially advantageous and important in testing strips and wires of different gage.



New Testing Machine for Bars, Strips and Wire

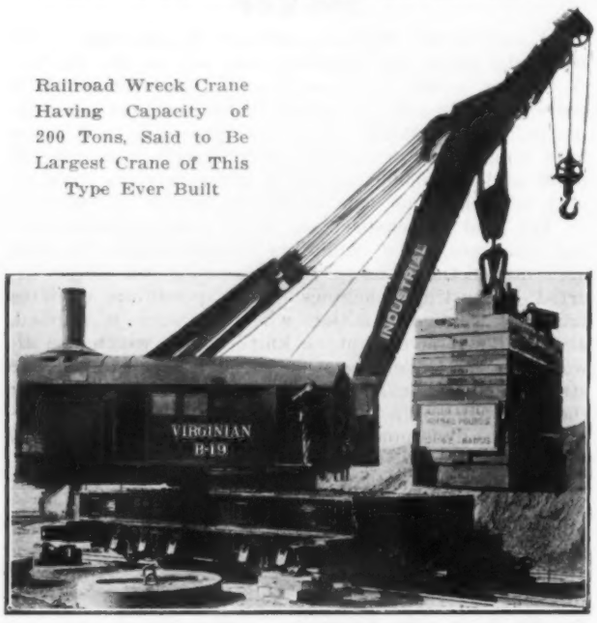
The machine as shown is of compact construction and self contained, mounted on a base 27 in. in diameter, not requiring any special foundation; it can be conveniently operated by hand. It is manufactured by the Amsler works of Switzerland, represented in this country by Herman A. Holz, testing engineer, 17 Madison Avenue, New York.

The Sessions Foundry Co., Bristol, Conn. has advanced wages of day and piece workers 10 per cent. More than 300 workmen will benefit from the increase. Labor is scarce throughout Connecticut, especially in the Hartford County district, with the general tendency of wages upward.

Industrial Works Builds 200-Ton Crane

What is said to be the largest railroad wreck crane ever built has been furnished the Virginian Railway Co., by the Industrial Works, Bay City, Mich. It has a capacity on the main hoist of 400,000 lb. at a 17½ ft. radius, with all outriggers; 200,000 lb. at the same radius with end outriggers only; and 85,000 lb. without outriggers, The capacities on the auxiliary hoist are 90,000 lb. at 24 to 30 ft. radius, with end outriggers only, and 60,000 lb. at 24 ft. without outriggers.

The crane is mounted on special-six-wheel trucks and



Railroad Wreck Crane Having Capacity of 200 Tons, Said to Be Largest Crane of This Type Ever Built

has a maximum axle load in running order of 64,000 lb. The car has a total wheel base of 26 ft. 2 in. and is 34 ft. long, the crane being 15 ft. 9 in. high at its highest point and 10½ ft. at its widest. The engines are 12 x 12 in. and steam is supplied by a 65 in., 160 lb. A. S. M. E. boiler. A Westinghouse air pump is provided and clasp brakes on each of the 12 wheels, the brakes being operated either by the engineer on the crane or by the engineer of the locomotive which may be hauling the crane in a train. Clutches are air operated. In running order the crane weighs 356,500 lb,

In building the crane the main problem of design was to keep within railroad clearances and the maximum allowable axle load, on account of bridges, of 65,000 lb., and still obtain the 200 ton capacity required by the unusually heavy rolling stock and motive power in use on the Virginian railroad.

The largest wrecking cranes in the world are said to have been built in the United States, and prior to the crane under consideration the largest equipment of this character was a 160 ton unit, having a maximum capacity of 320,000 lb. with all outriggers.

Carbonized Lignite Fuel

The vertical carbonizing oven, constructed at Grand Forks, N. D., in the course of a co-operative investigation by the University of North Dakota and the United States Bureau of Mines looking toward the commercial utilization of the northwestern lignites, has recently been operated under the supervision of W. W. Odell, fuel engineer, of the Bureau of Mines in the manufacture of lignite char on a commercial scale. Results were very satisfactory, and valuable information on the production of lignite char without the recovery of by-products was obtained. The cost of producing this char was reduced considerably below the cost of operation in the carbonizing oven used in 1921. A satisfactory grade of char was produced. Grates for the utilization of this char in the ordinary magazine feed house heating stove and for a house-heating boiler have been made at Pittsburgh and sent to North Dakota for distribution to domestic consumers.

October Sheet Shipments Show Substantial Gain

The October statistical report of the National Association of Sheet and Tin Plate Manufacturers, for the Bureau of Census, Department of Commerce, is based on a greater number of mills than previous reports of this kind. The total number of hot mills in the United States now is given as 658, having a capacity for October of approximately 385,000 net tons and the percentage of the capacity to which the October figures are related is about 68.9 per cent. Former reports detailed 641 hot mills with a capacity of approximately 365,000 net tons and the percentage of the capacity to which the figures related was 67 per cent.

	October, Net Tons	September, Net Tons	August, Net Tons
Sales	208,916	188,863	175,495
Production	243,746	202,600	228,398
Shipments	223,874	190,027	215,200
Unfilled orders	376,394	378,574	379,249
Unshipped orders	108,291	102,198	96,058
Unsold stocks	20,069	21,241	19,194

Molding Sand Investigation

The Bureau of Standards is conducting a series of tests to discover a sand with 100 per cent permeability. The advantage of finding a perfectly permeable sand or one which approximates perfect permeability is obvious. Having a standard sand with a known permeability, the suitability of every molding sand could be expressed in percentage of a sand found to be 100 per cent permeable. To accomplish this result, several sands have been investigated. One commercial grade of sand, which is a very pure silica sand of a fairly uniform degree of fineness, has been found on a number of tests, both dry and with as high as 4 per cent of moisture to be 100 per cent permeable. Further tests are being made to determine its colloidal matter or any other substances which might affect its permeability.

A. M. Castle & Co. May Decide to Build Freight Cars

A. M. Castle & Co., iron and steel jobber, Chicago, is considering engaging in the manufacture of freight cars. William B. Simpson, president of the company, has purchased property at 6601-33 West Grand Avenue from the receiver of the Ursus Motor Co. and may erect buildings to cost $750,000 to $1,000,000 for freight car construction. No definite decision has yet been reached, however, and it is possible that a separate company will be formed for the new undertaking. Heretofore the company has built freight car underframes and furnished supplies for railroad car makers.

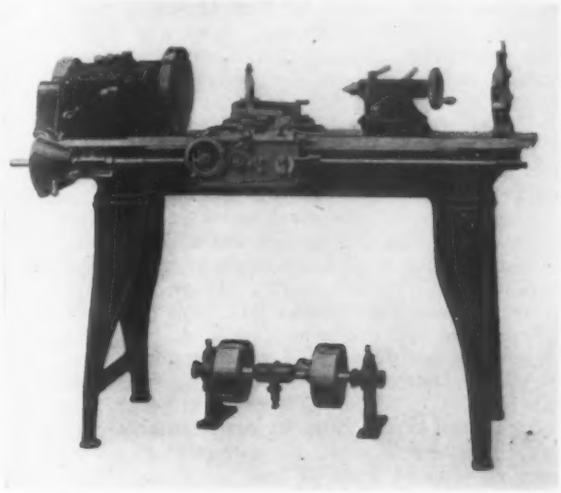
Pennsylvania Railroad Lifts Eastbound Embargo Temporarily

PITTSBURGH, Nov. 20.—Effective at midnight, Nov. 19, the Pennsylvania Railroad has suspended for the first three days of this week the embargo it set up Nov. 13, at midnight, as far as eastbound freight is concerned, and it is reported will suspend the embargo on westbound shipments for the last three days of the week. The benefit to the steel industry, it is believed, will be slight. While all restrictions as to the acceptance of freight by this road for the East, even as from connecting lines, are lifted, the modification makes no provision for the movement of freight already in transit; indeed, the new order specifically states that the freight accepted during these three days must be on bills of lading dated Nov. 20, 21 and 22. The steel trade is skeptical as to results, because it is feared that the lack of cars will have more bearing on the movement of goods than the apparent desire of the railroad to help prevent further additions to mill stocks.

Adds Smaller Engine Lathes to Line

Screw cutting engine lathes of 10, 12 and 14 in. size have been added to the line of the Oliver Machinery Co., Grand Rapids, Mich. The actual swing is said to be 11, 13 and 15 in. respectively. Each size is equipped with either cone pulley or all steel geared headstock, straight or gap bed, bench or floor legs, with or without oil pan, either with countershaft for belt drive or with self-contained motor drive.

The 12 in. geared head single-pulley driven engine lathe is illustrated. The headstock is of the inclosed box-type fitted with all steel gears running in an oil bath. Six spindle speeds are secured by means of two convenient levers at the front. One lever operates a positive-jawed steel clutch engaging either the back gears or the direct drive. The other lever shifts the three engaging gears which provides three spindle speeds direct drive, and three speeds through the back gears. The driving pulley of the geared headstock is



Geared Head 12-In. Screw Cutting Engine Lathe. A number of variations and attachments are available

fitted with a friction clutch operated by a shifting bar extended the length of the lathe. The headstock spindle is of high-carbon steel and is hollow. All headstocks are equipped with a positive-tooth feed reversing clutch, by means of which both the longitudinal and the cross feed and the direction of the lead screw may be reversed without engaging or disengaging gears, stopping the lathe, shifting belts or reversing the spindle rotation. This feature is intended to simplify the cutting of threads and decrease the time of operation.

The tailstock is of the offset type with screw set over for taper turning, graduated in 1/16 in. The spindle is graduated in 1/16 in. to permit accurate and rapid production when drilling to depth. The tail center is self ejecting.

The back of the carriage is machined and tapped ready to receive the taper attachment. The swiveling bar is graduated in inches and is adjusted by a screw and bronze swiveling nut for turning all tapers up to 4½ in. a foot. Settings and adjustments are made from the front of the machine. The carriage is wide and heavy and has a long bearing upon the bed on the Vees and is gibbed to the bed both in front and rear. It has a positive lock to prevent longitudinal motion while cross cutting. The carriage is drilled and tapped to receive taper attachment and follow rest and has T slots both at front and rear for attaching jigs and fixtures or special tools. Cross slide is accurately gibbed and is actuated by a large diameter square thread screw which receives power through a friction clutch. The cross slide screw has a 3-in. diameter hand wheel dial graduated in one thousandths of an inch. The compound rest has unusually large bearing surface. The base is circular and graduated in degrees permitting accurate setting. The screw has square threads, fitted with a large dial wheel graduated in 0.001 in.

The apron is screwed and doweled to the carriage. The apron gearing is arranged so that the operator may readily shift from thread cutting to the use of either the longitudinal or the cross feed without shifting of gears. The difference in the lead between chasing threads and that desired in feeding is provided by the use of a worm and worm gear in the apron. A friction knob operates either the cross or the longitudinal power feed. The feed lever has three positions; in the first it engages the power longitudinal feed; in the second it is neutral and permits the engaging of the lead screw; and in the third position it engages the power cross feed. The thread cutting lever operates the two halves of the lead screw nut which it can close about the lead screw only when the feed lever is in the neutral position. The lead screw nut is of phosphor bronze and threaded from the solid.

For motor driving the cone head lathes, a friction countershaft, supported on a swinging arm directly back of the headstock, is provided. The swinging arm and the motor are carried by a bracket bolted to the leg, and swivels about a bearing near the motor. It is adjusted to and from the headstock by means of a screw and hand-wheel operated from the front. A second adjustment regulates the motor vertically to take up stretch of motor belt. For motor driving the geared head lathes, two methods of self-contained motor drives are offered, the motor-on-head type and the motor-on-leg type.

The lead screw is milled with five pitch acme threads of sufficient accuracy for tool room precision. It is splined so that the power cross and longitudinal feeds are operated by a long key acting in the spline and the threads of the lead screw are used only when chasing threads. The selective change gear mechanism consists of mounting all of the gears of the change-gear set slidably on the end of the lead screw and supporting the weight, housing and guard of the gears by means of a slide bar and bracket attached to the bed. A full quick-change gear box is available if required.

Several variations and attachments are available. These include a universal milling attachment, follow rest, gap bed, extra bed length, turret on carriage or bed, draw-in attachments, metric transposing gears and others.

Italian Steel Works Reorganized

Reorganization of the Ansaldo Steel Works is being effected by the formation of a new company, bearing the same name, having a capital of 200,000,000 lire divided into 1,000,000 shares of 200 lire, says Consul Leon Dominion, Rome, in a report to the Department of Commerce. According to press notices, the Banca Nazionale di Credito has subscribed for 1250 shares, and the Gio, Ansaldo Co. for 998,750 shares. The new company has taken over the principal plants of its predecessor, among which are the Sampierdarena machine shops and locomotive works, Sestri Ponente dockyards, Borzon yards, Fegiano railroad car works, Campi cannon foundry, Delta steel works at Cornigliano Ligure, Campi electrical works, Multedo iron foundry, Cornigliano steel works and bronze and aluminum plants.

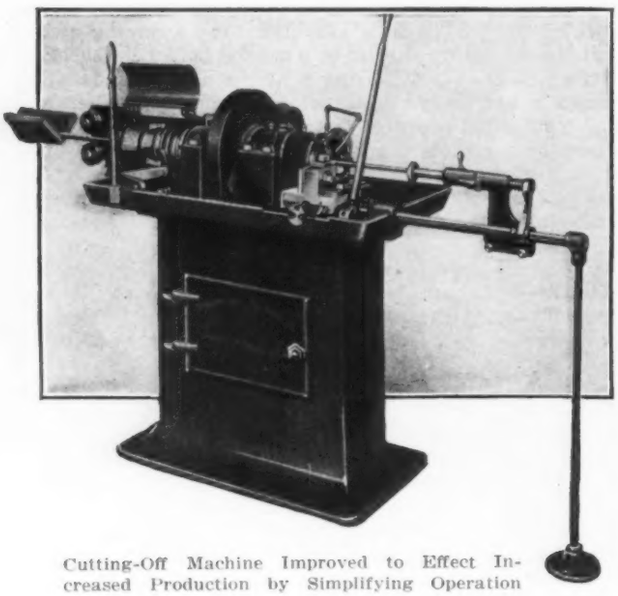
The purchase price of these establishments is stated to be 28,405,800 lire, and payment has been made to the old Ansaldo Co. by means of 142,029 shares of the new company. The new company furthermore assumes liabilities amounting to 40,261,339 lire on bonds issued for the account of the plants it has taken over and which are guaranteed by mortgages. About 45,000,000 lire in bonds remains in the hands of the old company.

The executive committee of the American Society for Testing Materials has voted to hold the 1923 annual meeting at Atlantic City in the latter half of June. Two periods for the meeting are tentatively under consideration. One is June 25 to 29, and the other is immediately following the meeting in Atlantic City of the American Railway Association, which is usually held from Thursday to Wednesday about the middle of June.

Improves Cutting-off Machine

The cutting-off machines of the Modern Machine Tool Co., Jackson, Mich., designed for cutting pipe, tubing and bar stock have been improved to save several motions on the part of the operator, and permit thereby of greater production.

The changes in construction include a double live roller feed as illustrated for feeding the stock through the spindle, this being for the Nos. 2 and 3 machines. An automatic stop for gaging the length of the cut-off piece has been added to all sizes. This is of the same design as formerly, but is operated from the tool block. A plate, which is adjustable to permit setting the tool for various sizes of stock, is attached to the right-hand side of the tool block. This is arranged with a lug to



Cutting-Off Machine Improved to Effect Increased Production by Simplifying Operation

catch and rock the rocker block, shown in the illustration, between the tool block and the frame. As the tool block is moved out to remove tool from the cut, in the last ⅛ in. of the movement the lug catches the rocker shaft and through the lever and cam rotates the stock stop, throwing it out 3/16 in. When the tool block is fed in to start the cut, a spring brings the stop back clear of the work. This arrangement is provided so that the stop will not wear and the work can drop away from the tool. A stop pin is provided to indicate when the tool is clear of the work.

The double live roller feed is driven through worm and gears from the cone pulley shaft as the machine is slowed up for large stock; it also slows up the feed. The rolls run continuously. They are trunnioned and connected with the collet-control lever shaft, and the in-movement of the collet lever opens the collet and brings the rolls simultaneously up to the stock. Further pressure on the collet lever feeds the stock through the spindle against the stock stop. The back movement of the lever throws the rolls clear of the stock and closes the collet. The collet control lever has been placed in a vertical position and has a toggle action intended to eliminate much of the friction of the previous design; the lever also operates more easily.

With the new machine the operator places his left hand on the collet control lever and pulls, which opens the collet and feeds the stock through the spindle up to the stop. He then pushes the lever to close the collet, and places his right hand on the tool-feed lever and when the collet is closed, feeds the tool into the work. The motion is then reversed. The operator does not remove his hands from these levers.

Compared with the previous design the new machine saves three or more motions and one step, on every piece cut off. On a production of 150 to 200 pieces per hour of large work or 500 to 600 of small work, it is obvious that the new equipment effects considerable savings.

Tariff Commission Gives Results of Its Investigation

WASHINGTON, Nov. 21.—Finding that preferential rates do exist, the United States Tariff Commission has issued a report entitled "Preferential Transportation Rates" which is the result of an investigation conducted by the commission to ascertain to what extent, if any, preferential rates affect the country's customs tariff when such rates as applied from the various ports to interior points in the United States, on imported commodities, are lower than those applicable on like domestic tariffs from the same ports to the same interior point. The report also deals with the extent to which the export rates from interior points in the country of export are lower to the foreign port on traffic destined to the United States than applied to similar domestic rates.

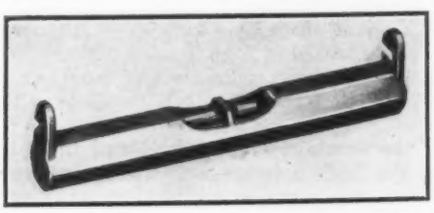
The report says that the principal ports in this country from which such rates apply are the South Atlantic, Gulf, and Pacific ports, and Portland, Me., the latter when routed by way of the Grand Trunk System. Similar preferential rates are also applied from various Canadian ports on traffic imported through those ports destined to points in the United States.

The conclusions reached by the commission are, that, while it is evident that preferential transportation rates do exist, the carriers have established such rates primarily for the purpose of equalizing the commercial advantage of the rival ports of the alternative routes over which the foreign trade is carried, rather than an attempt to offset in whole or in part the duties imposed by the customs tariff. As an illustration, the pivotal or basic port in most instances on traffic to the Central West appears to be New York, from which port the imports and domestic rates are generally the same. From other ports the rates are ordinarily established with relation to the rates from New York. In certain countries the export rates in some instances are lower than the domestic rates, the apparent object being to favor the export trade of that country. The commission's report also shows the result of its investigation of the export rates in this country, the import rates in foreign countries and the ocean rates as applied to traffic moving from and to foreign countries.

Aluminum Line Level

The aluminum line level illustrated, known as the No. 108, has been placed on the market by the L. S. Starrett Co., Athol, Mass.

Weighing but ½ oz., it eliminates sag in the line. It is 3 in. in length, and is made from ⅜ in. hexagonal stock so that it may be used effectively as a surface



Aluminum Line Level. It is 3 in. long and of ⅜-in. hexagon stock

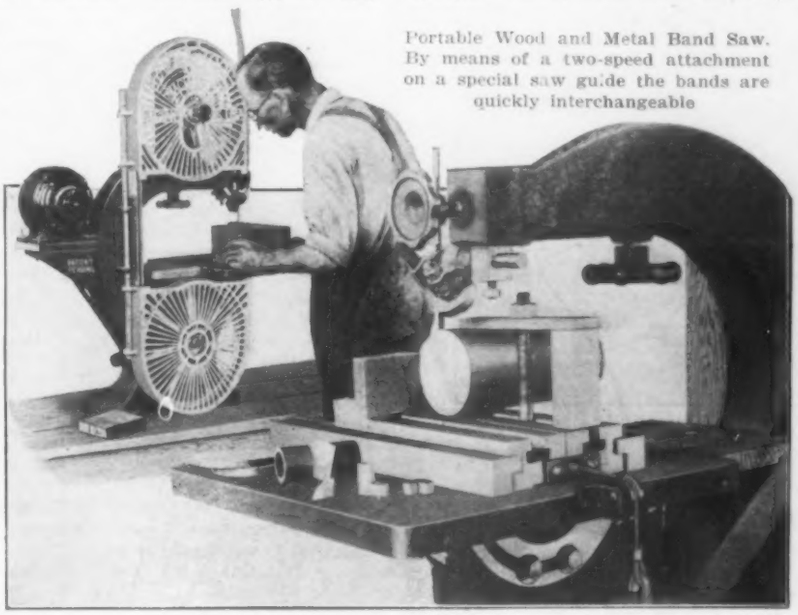
level. The level may be conveniently carried in the pocket. A luminous level glass with a yellowish fluid is used for the vial. The slots on the protruding pieces are constructed so that the part of the slot which comes in contact with the line is true in relation to the level. The design of the slots is said to prevent the level from dropping off the line when in use.

The special apparatus which has been developed at the Bureau of Standards, for testing the corrosion of steels by alternate immersion and exposure to the air is now perfected so that as soon as the different specimens have been properly heat treated, polished, measured, and weighted, the actual immersion tests can be started. A few preliminary tests which have been carried out indicate that the results will be obtained much more quickly by the method of repeated immersions than by simple immersion.

Wood and Metal Portable Band Saw

The Racine Tool & Machine Co., Racine, Wis., has put on the market the portable band saw illustrated, designed to cut either wood or metal. By means of a two-speed attachment and a special saw guide the wood and metal bands may be quickly interchanged. Combination spring-temper blades for cutting either soft metal or wood at high speed may also be used.

The machine is suitable for pattern work, sprue cutting, shaping jobs of various kinds in iron or steel, aluminum and brass cutting, fibre and hard rubber cutting in curves or squares, and for other purposes. Ball bearings have been provided for the band saw wheels to eliminate vibration. The bearings are contained in independent housings, a patented feature, suspended at three points, at both ends, which facilitates the accurate alinement of the wheels in manufacture. To secure accurate alinement of the blade a sensitive hand screw is provided for tilting the upper wheel. Tension on the blade is also controlled by a hand screw operating against a spring in such a way as to obtain a uniform and calibrated tension. The spring also serves as a safety device, as chips and blocks which accidentally fall between the band and the wheel will pass around the wheel without breaking the saw blade. The wheels are cast aluminum, reducing the weight and promoting the portability of the machine. The table is 15 x 15 in., tilts to any angle up to 45 deg. and carries on a substantial quick-acting saddle. The saw guide may be quickly adjusted to the desired position, being mounted on a square steel post. A two-speed attachment permits of quick speed change by merely shifting a lever. The machine is driven by a standard electric motor, from any light socket or power circuit, the motor being bolted directly to a platform on the frame as shown. For flexibility the machine is driven from the motor by belt. The wheel guards are of aluminum and are hinged.



Portable Wood and Metal Band Saw. By means of a two-speed attachment on a special saw guide the bands are quickly interchangeable

Without attachments the machine is adapted to cutting wood and soft metals. With two-speed transmission the speed may be reduced to the proper ratio for cutting steel. Sheet steel and flats up to ¼ in. may be cut without clamping in a vise. With two speed transmission and gravity feed vise the machine will cut bar stock, rounds, flats and shapes up to 3 in. in thickness.

New Record in Portland Cement

October production of portland cement, according to the United States Geological Survey, amounted to 12,287,000 bbl., the highest month's production in the history of the industry. This exceeds the figure for August, the previous high record, by 5½ per cent and brings the total for ten months to 93,850,000 bbl., comparing with the total for twelve months last year of 98,293,000 bbl., and for the twelve months of 1920, the record year to date, of a little under 101,000,000 bbl. With construction going ahead full tilt, November will probably add enough to the total to make the eleven months aggregate production greater than that of any full year previously recorded.

Shipments for October, at 12,854,000 bbl., were the fourth largest of the year, being exceeded by June, July and August and being slightly in excess of May and September. The August figure was 14,361,000 bbl. Shipments have so far exceeded production during the greater portion of the year that stocks have been reduced from 14,470,000 bbl. May 1 to 4,157,000 bbl. at the end of October.

Arc Regulation in Electric Furnaces

In any furnace where two or more electrodes are used, one of the main problems in operation is the proper regulation of the electrodes. There are now available on the market a number of automatic control systems which, when functioning properly, give excellent regulation and an even, well-balanced load. These automatic regulators are expensive, however, and for small furnaces are often cumbersome and impractical, so that a large proportion of the furnaces are and probably will continue to be hand-operated. The principal objects of regulation are to maintain correct power input, and to prevent both surges and large fluctuations in the power. In furnaces depending on hand control, the operator regulates the power by observing ammeters or wattmeters placed within his line of vision from the controls, and moving the electrodes up or down accordingly. On the whole the prevention of fluctuations is done more out of consideration for the power plant than for the furnace itself. However, there is another phase of regulation, not so often mentioned, which is of greater importance to the melter in the proper operation of the furnace, namely, keeping equal arcs on the various electrodes. Details of experiments regarding arc regulation in electric furnaces and pilot light control are contained in Serial 2411, by C. E. Sims, electrometallurgist, which may be obtained from the Bureau of Mines, Washington, D. C.

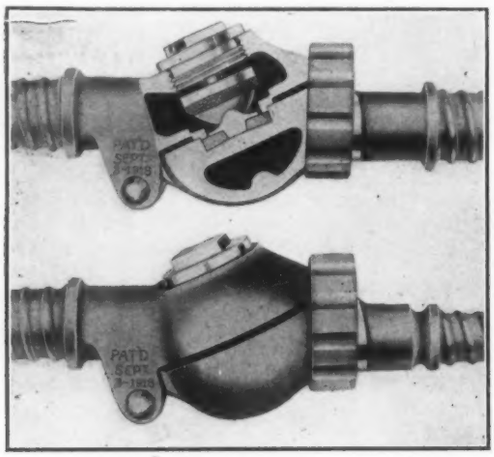
Workers in Shop Crafts Disagree

Following the official announcement by the Fore River Works, Bethlehem Shipbuilding Corporation, Ltd., Quincy, Mass., of its intention to do locomotive repair work for the New York, New Haven & Hartford Railroad, various shop crafts employed at that plant, through a committee, have notified the management the men are opposed to working on locomotives of a railroad where a strike exists. Sentiment among the union workers is mixed, however, a large percentage of them taking no ground against such work in view of the fact that striking New Haven shopmen took positions at the Fore River Works which rightfully belonged to union men. With sentiment among the workers split, there is little danger of the company's locomotive plans being upset.

The Alabama By-Products Co., Birmingham, Ala., proposes to build a 12-in. gas main four and a half miles long into the East Birmingham territory where there are many important manufacturing plants such as the National Cast Iron Pipe Co., which it already serves with gas. Among other plants proposing to use the gas is the Stockham Pipe & Fittings Co.

Automatic Air Hose Coupling

An air hose coupling which is in effect a valve and coupling combined, and which among other features is intended to take the place of the globe valve in the pipe line and thereby save the purchase of globe valves has been placed on the market by the Robinson Machine Co., Muskegon, Mich. In using the coupling air tools may be changed at the work without walking to and from the pipe lines to turn off the air. Kinking and bursting of hose in lengthening or shortening hose lines or in removing tools is eliminated. The pressure is thus always at the end of the hose line, and can be shut for



Automatic Air Hose Coupling. For changing tools the pressure is shut off simply by disconnecting the coupling

changing tools simply by disconnecting the coupling. This feature saves time and also air.

The coupling is shown in the illustration. It is available either for pipe or hose connections and made interchangeable in ½ and ¾-in. sizes. It is said to be positively air tight and can be taken apart with the pressure on as conveniently as with the pressure off. Durability is also a feature and it is claimed that the coupling cannot be blown out of hose lines. Positive grip hose clamps are part of the regular equipment. There is no corroding or sticking and oil has no effect on the coupling as the valve gasket is of oil-proof material. All parts are cleaned when the connection is made which eliminates clogging from scale and dirt.

The coupling is made in two halves. The half containing the automatic check valve is designed so that the pressure of the air in the line comes on top of the valve to assure tight and instant valve action. The valve is made up of a brass stem with a special leather disk-valve facing which may be replaced without special tools. The valve stem is centered by a reamed hole in the valve cap. Two projections with a cross bar extend beyond the face of the valve seat, and these serve to protect the seat when the valve half is being dragged along the floor, as at the end of a hose. The cross bar also forms a pivot for hooking the hose-shank half when making the connection.

Two small projections extending beyond the valve face on the hose-shank half serve to push the valve open when the connection is being made, admitting the pressure to that section of the line. This part is recessed to receive a specially treated gasket, which is cemented permanently in place. These gaskets are said to have held up from six months to one year under severe operating tests.

The two halves are quickly locked together by the eccentric clamping ring shown. Hose shank halves are equipped with "positive-grip" hose clamps which make them ready for attachment to air lines and eliminate the trouble caused by couplings blowing out of the hose lines.

Freyn, Brassert & Co., Chicago, have recently contracted for installation of patented bacon waste heat boilers at the Bettendorf Co., Bettendorf, Iowa, and at the plant of the Carpenter Steel Co., Reading, Pa.

Exhibitors at New York Power Show

A list of exhibitors who will exhibit at the National Exposition of Power and Mechanical Engineering at the Grand Central Palace, New York, Dec. 7 to 13, includes the following:

Allen-Sherman-Hoff Co.
American Arch Co.
American Refractories Co.
American Steam Gage & Valve Co.
Ashton Valve Co.
Bailey Meter Co.
Beaumont, R. H., Co.
Bernitz Furnace Appliance Co.
Bethlehem Shipbuilding Corporation
Bishop & Babcock
Boig & Hill
Bowser, S. F., & Co.
Burhorn, Edwin, Co.
Carling Turbine Blower Co.
Carlyle-Johnson Machine Co.
Cash, A. W., Co.
Celite Products Co.
Cochrane Corporation, H. S. B. W.,
Combustion Engineering Corporation
Connelly, D., Boiler Co.
Connery & Co., Inc.
Coppus Engineering & Equipment Co.
Craig Damper Regulator Co.
Crane Co.
Davidson, M. T., Co.
Dearborn Chemical Co.
DeLaval Separator Co.
DeLaval Steam Turbine Co.
Detrick, M. H., Co.
d'Este, Julian, Co.
Diamond Power Specialty Co.
Drake Non-Clinkering Furnace Block Co.
Edward Valve Mfg. Co.
Ellison, Lewis C.
Erdman Forced Draft Burner Co.
Falls Engine Stop Co.
Flinn & Emerich
Foster Engineering Co.
Foxboro Co.
Frederick Iron & Steel Co.
Furnace Engineering Co.
Gibby Engineering Co.
Gillis-Geoghegan, Inc.
Graver Corporation
Green Engineering Co.
Griscom-Russell Co.
Harris, Burt
Hays, J. W., Co., Inc.
Hill Clutch Co.
Huber-Hand Stoker Co.
Hunt, C. W., Inc.
Huyette, Paul B., Co.
International Filter Co.
International Combustion Engineering Corporation
Jenkins Brothers
Kelly Valve Co.
Keasbey & Mattison
Kieley & Mueller
King Refractories Co.
Kingsbury Machine Works
Ladd, George T., Co.
Lead Lined Iron Pipe Co.
Leather Belting Exchange
Leddell Metals Co.
Liptak Fire Brick Arch Co.
London Steam Turbine Co.
Lopulco Systems
Lunkenheimer Co.
McLeod & Henry
Mack Engineering & Supply Co.
Manning, Maxwell & Moore
Martin-Morse Corporation
Merritt, L. R., & Co.
Midwest Engine & Supply Co.
Mineral Oil Paint Co.
Murphy Iron Works
Nash Engineering Co.
Olsson Corporation
Otis Elevator Co.
Philadelphia Gear Works
Pittsburgh Testing Laboratory
Pittsburgh Valve Foundry & Construction Co.
Power Specialty Co.
Pratt & Cady Co.
Pyramid Iron Products Corporation
Quigley Furnace Specialties Co.
Racine Machine Tool Co.
Rahmann, George, & Co.
Reading Steel Casting Co.
Reliance Gage Column Co.
Republic Flow Meters Co.
Roto Co.
Ruggles-Klingeman Mfg. Co.
S. C. Regulator Mfg. Co.
Sanford-Riley Stoker Co.
Scovill Mfg. Co.
Schaeffer & Budenberg Mfg. Co.
Smith & Serrell
Spence, Paulsen Co.
Stewart-Sayer Co.
Superheater Co.
Tagliabue, C. J., Mfg. Co.
Templeton Mfg. Co.
Tidewater Oil Sales Corporation.
Tracy Steam Purifier Co.
Uehling Instrument Co.
Underfeed Stoker Co. of America
Underfeed Stoker Co. of Canada
U. S. Cast Iron Pipe & Foundry Co.
Vibration Specialty Co.
Vincent Gilsen Engineering Co.
Walworth Mfg. Co.
Watts Regulator Co.
Wheeler, C. H., Mfg. Co.
Wheeler Condenser & Engineering Co.
Yarnall-Waring Co.

At the recent hearing of the Southeastern rate case, in Cincinnati, before Interstate Commerce Commissioner Eastman, R. R. Robinson, representing the United Alloy Steel Co., Canton, Ohio, testified that while Canton steel industries were on a par with Youngstown, Pittsburgh and other steel producing centers, which enjoy one rate charge into Southern territory, Canton concerns were forced to pay the combination rate now in effect, thereby practically eliminating the Canton manufacturers as competitors in Southern territory. Youngstown and Pittsburgh industries had enjoyed the one rate charge for 20 years, and he asked that the Canton producers be placed on the same basis as their competitors.

RAIL PROSPECTS IN JAPAN

Little General Demand—Dullness in Copper and Other Markets

TOKIO, JAPAN, Oct. 26.—The steel market is looking brighter as extension projects are being planned on railroads throughout the country. Rails, especially 60 lb. sections, are in good demand, and dealers having disposed of heavy stocks are contemplating re-ordering from American mills. The decline in demand for construction materials because of prohibitory prices has resulted in this sudden energy in railroad construction.

Steel rails, however, present the only bright spot in the market, other prices suffering from a lack of demand. Although shipyards are slightly busier than during the early part of the year, they are heavily stocked with plates and other materials. Round bars are in fair demand, and are quoted at about 4.60 yen per kwamme (5.72c. per lb). Sheets stand at 7 yen (8.48c. per lb.) and plates are offered at 4.20 yen per kwamme (5.08c. per lb.). Sixty pound rails are quoted at 15,000 yen ($77.10 per ton) per mile and 12-lb. rails stand at 2500 yen ($64.24 per ton).

The total consumption of zinc sheets in this country amounts to about 1500 tons a year, used for packing tea and matches. Lately the export of matches, for which about 70 per cent of the zinc is consumed, has been inactive, and the demand for material from this quarter shows a great decrease. For this reason, speculative imports of goods have been terminated and goods which were quoted at 19.50 yen last spring show an improvement to 25 yen for spot delivery and about 26 yen for forward delivery.

Copper in Japanese Hands

Before the customs duty on electrolytic copper was increased last spring, copper merchants imported a large quantity of American copper. After the duty was increased, the arrival of copper practically ceased, with the result that the shortage of supply of Japanese copper was made up from these imported stocks or with scrap copper. According to the latest investigation, stocks of foreign copper remaining in the Kobe and Osaka markets have decreased to 350 tons. For a long time the home market had been governed by the quotation of imported copper, but it is believed that the Japanese copper producers, having made it unprofitable to import copper, will resume their influence over the domestic market.

The tenders for the purchase of electrolytic copper amounting to 400 tons were opened at the Tokio Arsenal, Oct. 13. The tender was in four parts. The offers per 100 kin were as follows: Sumitomo, 43.848 yen (16.10c. per lb.); Kuhara, 44.13 yen (16.20c. per lb.); Fujita, 44.15 yen (16.21c. per lb.); Mitsui, 44.19 yen (16.22c. per lb.); Mitsubishi, 44.38 yen (16.29c. per lb.); Furukawa, 44.53 yen (16.35c. per lb.); Okura, 47.07 yen (17.28c. per lb.); Samuel, 47.94 yen (17.60c. per lb.). The offer made by the Sumitomo Copper Co., the lowest, being much higher than the estimate of the Arsenal, the tender was repeated, when most of the bidders renounced their right of bidding, but Sumitomo and Mitsui went in for it, the former bidding 43.752 yen (16.07c. per lb.) and the latter 43.734 yen (16.06c. per lb.). The offer being still higher than the estimate of the Arsenal, no business was concluded. The Government might exercise its right of importing the copper duty free.

Tin plate is weaker, despite the fact that imports have fallen off recently. Prices are again declining, after stiffening slightly during the first few days of the month. Consumers are making but few inquiries. Added to the slack demand, there is a report that steel mills in India have become interested in the Japanese market, and are expecting to offer tin and iron products on the local market soon. Some business is already being done in Kobe and Osaka.

FRENCH IRON AND STEEL

Little Pig Iron Available—Active Exports of Semi-Finished Material

PARIS, FRANCE, Nov. 9.—Although slow on inland orders, the market is rather active for export. Unfortunately, low prices have still to be accepted for foreign business. The recent political difficulties in the Near East unfavorably affected the market, which is still watching anxiously what may happen in Turkey. Prices for inland orders are generally firm, except on semi-finished and rolled merchant products, which are weak. Pig iron production increased from 419,000 tons in July to 447,000 tons in August and 462,000 tons in September. On Oct. 1, the number of French furnaces in blast was 103, out of a total of 221, as follows:

District	Number in Blast	Total Furnaces
Lorraine	41	68
Meurthe-et-Moselle	40	84
Northern area	4	*20
Other districts	18	49

*Most of these destroyed during war and now being reconstructed.

A few blast furnaces in the Northern area are about to be relighted, and coke for them will be supplied from the reconstructed batteries of the Lens Coal Mining Co., which will begin in December to ship 10,000 tons of coke per month. So far, producers have had no difficulty, with the assistance of good export business, in finding an outlet for their increased production, but export business is low-priced.

The Reparations Commission has decided to ask Germany for a monthly supply of 569,000 tons of coke for France, 74 per cent and Luxemburg 26 per cent from Nov. 1 until Jan. 31, 1923. Luxemburg would be entitled per month to 148,000 tons and France to 421,000 tons. For the first nine months of 1922, Germany shipped to France 3,131,000 tons of coke, against 3,513,000 tons due. The tonnage of coke asked for by the Reparations Commission, which is the same as that in force from Aug. 1 to Oct. 31, is just sufficient to operate the blast furnaces which are now in commission, without permitting any further development.

Iron Ore.—The ore market is improving but slowly and prices are unchanged. Although Germany has recently increased her imports of French minette, her purchases of that ore, mined within proximity of Rhenish-Westphalia and extensively used by German blast furnaces for many years, ought to be much more considerable than they are now. Negotiations with a view to exporting Lorraine ore to the Cleveland district of Great Britain have not yet been concluded, but as satisfactory results were obtained from the samples sent, it may be that sooner or later regular shipments will be made. The recent difficulties which arose in the United States over the transportation of iron ore from the lakes to consuming centers suggested to French producers that it would perhaps be feasible to ship French ore to American furnaces situated close to the coast. This would probably have been comparatively easy at the time the United States shipped coal to France, and Lorraine iron ore might then have furnished a satisfactory return freight. Unfortunately, the situation has now changed and French ports have little to offer in the way of cargo boats returning to the United States. The Briey ores, which hold only 35 per cent of iron, in a dry state, and 40 per cent in exceptional cases, are really too poor to bear the cost of transatlantic transportation. However, France is producing other iron ores, in Normandy and Brittany, for instance, of a higher grade than the Lorraine ores, which could perhaps be exported to the United States.

Foundry Iron.—Available supplies of foundry iron are restricted and hardly any tonnage is to be had for November delivery. For December delivery, chill-cast foundry iron No. 3 P. L. is being dealt in at an average price of 235 to 245 fr. but fine qualities are currently sold at 250 fr. The export price, f.o.b. Antwerp (Belgian currency) is 255 to 260 fr. per metric ton.

Hematite Pig Iron.—The appreciation of phosphoric pig iron and the high value of the sterling—which is, of course, shutting out completely British competition—have considerably improved the market of French hematite. Present prices at furnaces: In the North, 300 to 320 fr. in the Center, 280 to 290 fr. in the East and South, 290 to 310 fr.

Semi-Finished Steel.—France produced in September 407,000 tons of steel (399,000 tons of ingots and 7400 tons of castings), as against 397,000 tons in August and 390,000 tons in July. Semi-finished products are selling with difficulty on the inland market, but they are active for export. Great Britain is taking some supplies in France, and Germany is purchasing large tonnages of French billets. Some orders from Germany for open-hearth steel, besides her customary orders for basic, are also reported. Present export prices, f.o.b. Antwerp, are about as follows, in Belgian currency:

	Francs
Ingots	310 to 315
Blooms	320 to 325
Billets	355 to 360
Sheet billets	375 to 380

These prices are for basic steel 20 fr. more for open-hearth steel.

Beams.—Orders for beams have shrunk considerably, as is, of course, quite normal at this time of the year. However, mills are now booked up for at least three months ahead. The export price, f.o.b. Antwerp (Belgian currency), is 380 to 390 fr.

Rails.—The large order in rails for the consortium of French railways, which has been in suspense for a long time has not yet been allocated but a solution reserving the whole of the order to French makers is now in view. We may say that the base price of 500 fr., corresponding to a price of coke of 95 fr. at the Franco-German frontier and sliding with it, had been mentioned for this order a few days ago. The following export prices are now quoted, in Belgian currency, f.o.b. Antwerp: Heavy rails, 420 to 425 fr., and light rails, 400 to 410 fr.

Plates and Sheets.—The volume of orders booked in October by the Comptoir des Tôles is slightly exceeding that of September, which was over 40,000 tons. Nevertheless, the tendency is quieter and, although mills are well provided for with orders for some time to come, there cannot be any question now of an increase of basic prices. French shipbuilding yards have recently increased their orders for plates. Export prices, f.o.b. Antwerp, (Belgian currency) are:

	Basic Fr.	Open-Hearth Fr.
Sheets of 5 mm. and over	470 to 480	520 to 530
Flat bars	450 to 460	470 to 480

Rolled Merchant Products.—The inquiry for rolled merchant products continues to decrease except for export. Substantial orders from Germany are to be specially mentioned. At any rate, order books are not now as full as they used to be and there are many works which accept for eight to ten weeks delivery, while in September four or five months delivery was common. The average selling price in Meurthe-et-Moselle and Lorraine remains at 440 fr., which is about 30 fr. below the parity of the present price of pig iron (240 to 250 fr.). The base prices of rolled merchant products in other districts are: Saar, 430 to 440 fr.; North of France, 470 to 480 fr.; West of France, 500 to 520 fr. Export price, f.o.b. Antwerp, (Belgian currency): 425 to 430 fr.

Hoop and strip iron is selling at 550 to 560 fr. in the Saar district and 600 to 620 fr. in Lorraine.

Rolling Stock.—The French State Railways have just ordered 450 two-axle passenger cars.

MORE CARS NEEDED

Modification of Open Top Order Brings Some Relief—Lake Season Near End

YOUNGSTOWN, Nov. 21.—District industrial interests are still feeling the pinch of car shortage, which is holding up outbound shipments of finished products. Car supply, however, is improving and will show further betterment now that the Interstate Commerce Commission has modified Service Order No. 25, restricting movement of open top cars to insure priority to coal shipments. The new order permits more freedom in use of cars south of the Ohio and Potomac. The entire cancellation of this order would permit the steel plants to ship their products in all directions with more freedom, but it would also enable them to build up coal stocks. Major interests in the Mahoning Valley have been able to create little coal reserve against winter needs because of diversion to the Northwest via the Great Lakes.

Termination of the lake season, now at hand, not only insures the release of thousands of cars heretofore restricted to coal movement, but the release of a large output of bituminous coal for industrial uses. It is customary for the steel plants to have ample coal reserves on hand at this time of the year, to protect themselves against possible interruptions to shipments because of weather conditions. But this year what stocks have been accumulated are much smaller than usual.

Mild weather conditions throughout the Middle West to date have been in favor of the industries as well as the railroads. Transportation has been much more efficient than if the railroads were hampered by freezing weather.

Traffic conditions now are much improved as compared with October. The Republic Iron & Steel Co. is again operating its Niles sheet plant on a normal basis, following a two weeks' production at 50 per cent to enable the railroads to clear accumulated output. Because of transportation difficulties and substantial stocks on hand, the Trumbull Steel Co. was forced to suspend its No. 2 strip mill four days last week. Inadequate car supply is also reflected in operations of the metal lath department of the Youngstown Pressed Steel Co. at Warren.

For a time, curtailment of operations by the two large independent pipe makers in the Mahoning Valley was threatened because of lack of cars. Special measures were taken to bolster car supply, however, and this expedient is no longer necessary.

The peak of the fall freight movement is past, but shipments, both inbound and outbound, will continue heavy for the next four weeks. Ore consignments are declining and will soon largely cease. Heavier coal movement will partially offset this loss.

Meanwhile, railroads are pushing repairs to cars and locomotives long neglected during the prolonged shopmen's strike. This work is being rushed and shops throughout this territory are being operated by day and night shifts. There has been an appreciable improvement the past month in the condition of locomotive equipment. Railroad operating officials point out that a late and mild winter would prove highly beneficial to them, and permit the carriers to place rolling stock in readiness for normal transportation next spring.

This week the Pennsylvania Railroad is enforcing an embargo against shipments on its Eastern and Panhandle divisions, restricting freight movement in these directions.

Meanwhile independents are maintaining operations at 80 per cent. This week iron output is increased by the resumption of Claire blast furnace of E. W. Mudge & Co. in the Shenango Valley, increasing the number of active furnaces in the two Valleys to 21 out of 47.

The explosion of a pot of tar in a warehouse at the plant of French & Hecht, Springfield, Ohio, manufacturers of metal wheels, caused a fire Nov. 20 which damaged the plant to the extent of $8,000.

Following official notice of a six-day week being established at Navy Yards, effective Dec. 1, orders were received at the Charlestown Navy Yard, Boston, to reduce operating forces.

Bases of Modern Blast Furnace Practice*

Elements of the Design Which Go to Make Up the Lines of the Furnace—Influence of the Low Bosh

BY A. K. REESE

II.—Furnace Design

THIS refers not to the structural detail of the furnace as a whole, but to that portion only in which the metallurgical operations take place; that is, the furnace proper, the interior space, the design of which is technically known as the "lines of the furnace." The terms usually used to describe the lines of a blast furnace divide it into a number of sections—the hearth or crucible, which is cylindrical; the bosh, an inverted truncated cone; the shaft, an upright truncated cone; and the throat—in modern furnaces usually cylindrical—extending from the top of the shaft to the top of the furnace.

The principal dimensions of these sections consist of heights, diameters, the acute angle of the bosh wall to the horizontal, and the batter of the shaft wall to the vertical. Each of these dimensions has an important bearing upon all the others, and their relation to each other is of first importance as a factor in modern furnace practice; for, although they may vary somewhat in their relations, the variations are limited to conform to certain principles, the height of the furnace and hearth diameter being the dimensions which control all the others.

Under this heading the author proposes to outline and discuss these principles, and to enunciate as a general law the principle that *the output capacity of a blast furnace (with any particular set of raw materials) is in proportion to the effective bosh area.* The nucleus of this law is the word *effective* for, as will be shown, the maximum effective bosh area is dependent upon the various factors which constitute the principles of modern blast furnace practice.

Modern development has established the following essentials: a shaft batter of 1 in 13.5 to 15, the low bosh, the large hearth diameter, and the step bosh angle—all of which are, of course, comparative terms in their relation to similar features in the older designs. Fig. 1 shows two furnaces, A and B, of pre-modern lines (extreme cases have been chosen in order to emphasize the principles under discussion), and Fig. 2 two furnaces, C and D, of modern lines. Present tendency is further to increase the hearth diameter, and a furnace is now in successful operation with a hearth diameter of 29 ft. 9 in., but in this direction it is sufficient for the present purpose to avoid the extremes.

Throat and Stack

The upper section of the furnace or throat, usually cylindrical in shape, extends to from 20 to 25 ft. below the furnace top, or 12 to 17 ft. below the stock line, the highest point to which the furnace may be filled. The adoption of the cylindrical throat is primarily to obtain the desired batter to the shaft walls, although it also has a bearing upon regularity of distribution, by presenting to the charged materials an area of the same dimensions for the varying positions of the materials in the throat due to their constant movement. The latter point, however, is not of great importance in the modern furnace plant, as the charging appliances are usually, or should be, of ample capacity to keep the furnace fully charged at the highest rate of driving.

Within the distance to which the cylindrical throat extends, the condition of the materials is such that there is no tendency for them to adhere to the walls or to hang through jamming or arching, as they are in a "dry" condition, both as to moisture and pastiness, and their expansion through increase in temperature is not yet sufficient to require increased space for their accommodation so as to avoid the danger of restricting free movement. Below this point, however, temperature increase becomes much more rapid and reactions much more intense. In this alteration in condition and temperature, which is progressive as the materials descend, more space accommodation is required for free movement, more particularly because to expansion is added the semi-pasty and pasty condition, and the increased density of the mass through the increasing load bearing down upon it from the increasing weight of superimposed materials.

It is also probable that the question of carbon deposition enters into the necessity for greater space accommodation, as the materials descend into the hotter and more active regions of the furnace: hence the necessity for the expanding batter to the shaft walls. It would also seem obvious that the more rapid the descent of the materials into and through these zones (faster driving), the greater must be the increase in space accommodation. In the older furnace designs, with slower driving, shaft batters as low as 1 in 20, and possibly less, were in use. In modern practice it has been found necessary to increase this batter to 1 in 14, or thereabouts. The principles involved in this feature of modern furnace design are of greatest importance and probably explain, in part at least, why many furnace managers have failed in their attempts to apply fast driving to furnaces with lower shaft batter.

To revert for a moment to throat diameter, there are in this feature several opposing conditions to consider. The lower the velocity of the gases as they leave the furnace top, the lower the loss from flue dust carried over with them. The largest possible throat diameter is, therefore, desirable for this reason. On the other hand, the extent to which this feature may be provided for is limited by the question of distribution, both of the materials charged into the top and the ascending gases, as regards the most uniform action of the latter over the whole cross section of the former. The throat diameter is also limited by the required shaft batter and the bosh diameter and height. Sacrifices must, therefore, be made in one direction or the other and, as the question of losses by flue dust is largely affected by regularity of stock movement, features tending to the latter should have first consideration. Throat diameters are, therefore, restricted in modern furnaces of 85 to 95 ft. in height to from 15 to 17 ft., the controlling factors being the other dimensions such as hearth diameter, bosh diameter and height.

The Low Bosh

The low bosh was the direct outcome of attempts to increase furnace outputs by increasing the volume of blast blown per minute. These attempts with the old high bosh furnaces resulted in seriously increased furnace irregularities, the reason for which became apparent from the study of the altered conditions brought about in the furnace through the more rapid driving, and the troubles experienced. With the much more rapidly descending materials it was found necessary that the contracting part of the furnace, that is, the top of the bosh, should begin below the upper limit of the zone of fusion, to prevent the pasty materials just above that zone from entering the contracting area, where they would be subjected to a squeezing action as a result of the resistance of the bosh walls and the weight of the superimposed materials, with the conse-

*Abstract of paper read before the (British) Iron and Steel Institute; concluded from page 1254, Nov. 9.

quent tendency to pack and cause hanging and the formation of scaffolds on the upper bosh walls.

Continued lowering of the top of the bosh followed therefore continued attempts at faster rates of driving for larger outputs, until in modern practice a bosh height, or 85 to 95 ft. furnaces, of 10 to 12 ft. above the top of the crucible, has been adopted, as compared with as much as 30 ft. in the old design. While it is true that no one would build a furnace with a 30-ft.

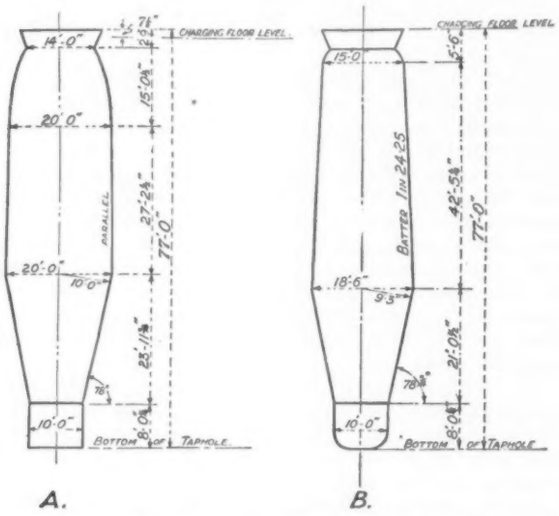


Fig. 1 Shows Pre-Modern Lines in Two Blast Furnaces of Differing Sectional Contours

high bosh to-day, there are furnaces in operation of recent design with boshes 16 to 18 ft. or even higher. Any attempt to drive such furnaces rapidly is sure to result in increased irregularity and consequent failure. The basis of this principle—the low bosh—is, therefore, that the furnace must be so designed, as regards bosh height, that the expanding portion or shaft shall continue to a point slightly below the beginning of the melting zone, so that no pasty materials shall enter the contracting portion at the top of the bosh.

In practice most modern furnaces are designed with a cylindrical section from 5 to 8 ft. in height between the lower limit of the expanding shaft and the upper limit of the contracting bosh. This section has no justification from the standpoint of any principles involved in its adoption, except that it fills up with brickwork the angular space at the junction of the bosh and shaft, which to a degree may be considered "dead space," and renders less abrupt the transition from the expanding shaft to the contracting bosh, but is rather the result of necessity in order to obtain the desired relation between other features such as shaft batter, throat diameter and bosh diameter and height.

The bosh diameters, for what may be called full-sized blast furnaces, that is, from 85 to 95 ft. high, are usually from 20 to 23 ft., with a bosh angle of about 80 deg., while in pre-modern designs this angle was anything from 68 deg. or less to 74 deg. The latter feature is the result of the progressive increase in hearth diameters, and these two features, the steep bosh angle and the large hearth, are concomitant, and their evolution the result of efforts to overcome irregularities through the failure of earlier designs (with the flatter bosh and smaller hearth diameter) to bring into operation the maximum effective bosh area, which is, of course, the full bosh area.

The Hearth or Crucible

In modern full-sized furnaces hearth diameters are normally from 16 to 18 ft., although, as already mentioned, in one instance this dimension has reached 20 ft. 9 in. But it remains to be seen whether hearths of this extreme size are likely to be generally adopted. In the process of evolutionary experiment it is often necessary to overreach the maximum in order to ascertain what it really is.

The hearth diameter of a blast furnace would seem, at first sight, to be the determining factor for its output capacity. It is the starting point in the design and, with the bosh angle and bosh height now generally adopted in modern design, practically determines the bosh diameter. But in the sense that the hearth diameter, together with the low bosh and steep bosh angle, are merely means for making effective the maximum bosh area, it is not really the determining factor, which is the bosh diameter. The hearth, or more properly the crucible, is the receptacle for receiving and storing from cast to cast the molten materials, while the bosh area is the active area in which the molten materials are produced as such, and the proportion of that area which is in active operation is the determining factor as to the quantity of molten materials available for collection in the crucible.

In all previous references to the various dimensions of the modern blast furnace and the principles which have led to their adoption it is assumed that in the operation of the furnace the volume of blast is in keeping with the size of the furnace, and is such as will provide the operating conditions upon which those principles are based. In modern practice the volume of blast blown is normally from 40,000 to 50,000 cu. ft.

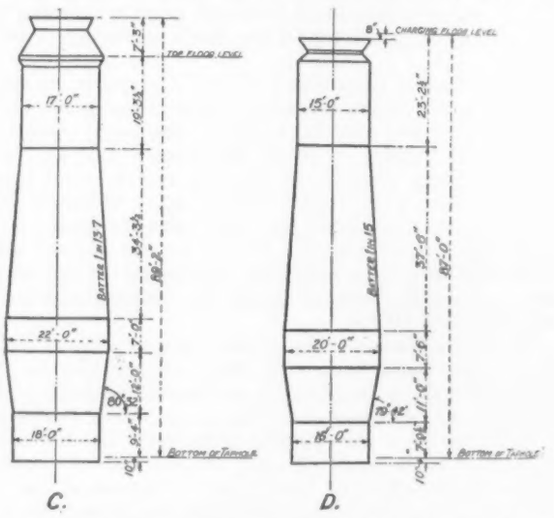


Fig. 2 Shows Two Furnace Sections of Modern Lines, with Larger Hearth and More Rapid Batter of Shaft Than Was Formerly Thought Desirable. In both cases there is a short parallel-sided or cylindrical section between bosh and shaft, and a cylindrical throat surmounts the shaft

of free air per min., from engines capable of delivering these volumes against resistances up to 25 or 30 lb. per sq. in., to provide ample reserve power for conditions causing abnormally high pressures. Normal working pressures are usually between 15 and 20 lb.

Effective Bosh Area

This term, used several times in the foregoing, while a new one in blast furnace nomenclature, has a meaning of the first importance in blast furnace operations. A general law has been enunciated that "the output capacity of a blast furnace, with any particular set of raw materials, is in proportion to its *effective* bosh area." Before discussing this proposition it is necessary to define:

1. What is the "effective bosh area?" and to consider
2. What are the factors which control or determine the effective bosh area?
3. What bearing have these factors (through their determination of the effective bosh area) upon the output capacity of the furnace?

1. The effective bosh area is that portion of the full horizontal bosh area at its maximum diameter which is in normal activity under the conditions of operation of the furnace.

2. The factors which control or determine the effective bosh area are the condition of the materials charged, the furnace lines and the volume of blast blown per minute in relation to the size of the furnace.

3. The bearing these factors have upon the output capacity of the furnace is that they determine the area of activity in the melting zone.

The whole trend of evolution in blast furnace practice has been in attempts to devise means of increasing output capacity consistent, of course, with quality and economy. The degree to which these attempts have been successful in modern practice has been due to the influence the factors in that practice have had in increasing the ratio of effective bosh area to the maximum or designed bosh area of the furnace or, to put it in simple terms, *to keeping the walls clean.* It is therefore conversely true that the effective bosh area of blast furnaces, where the factors upon which modern practice is based have not been adopted, or which are not operated in conformity with its principles, is less than the maximum or designed bosh area.

As has been described, the direct tendency of lack of such preparation is toward restriction of active area in the furnace. The tendency of the high bosh and the low stack batter is shown to be toward restriction of active area in the furnace. Equally the tendency of the small hearth and flat bosh angle is toward restriction of effective bosh area, owing to the removal of the area at and adjacent to the top of the bosh near the walls too far horizontally from the upward moving gases, with the consequent tendency for accumulation of torpid or stationary materials in that area.

For a furnace of given size, insufficient blast volume to insure equal activity throughout the whole cross section at every altitude tends to produce inactive areas, owing to the impossibility of providing perfect uniformity of materials. The greater this lack of uniformity the greater this tendency. The under blowing of a furnace is one of the most fruitful causes of reduction of effective bosh area, with outputs far below maximum output capacity.

A furnace tends to adjust its active areas to the volume of blast supplied to it. This tendency is in strong evidence where furnaces which have been blown for a considerable period with comparatively small blast volume have been suddenly and too quickly supplied with a considerably increased volume. Operators who have made this experiment will doubtless recall the difficulties they have experienced through irregular working. The author knows of cases where, although the furnace size was quite suitable to the increased blast volume, the attempt has been abandoned through the conclusion that conditions were not suitable to faster driving, whereas a little persistence would probably have overcome the difficulties met with by the walls gradually clearing, and the furnace thus adjusting itself to the larger blast volume.

It is true that many furnaces in operation to-day are not adaptable to modern practice in its fullest sense. One or more of the necessary factors are lacking and, as the author has attempted to show, each of these factors is so dependent upon the others that they must all be present for its full application. Among them, however, preparation of materials, if adopted alone, would provide conditions which would render possible the partial application of others, with decided improvement in results, and tend to remove many of the difficulties now experienced.

IV.—Method of Operation

A paper of this nature would not be complete without some reference to an essential difference in the method of operation by which the improvements in results, made possible by the adoption of the factors already discussed, are obtained, and the method of operation still prevalent in many localities where modern practice has not been adopted. In modern practice the nearest possible approach to uniformity in all controllable factors is a first principle, to obtain the nearest possible approach to uniformity of action within the furnace.

Reference has been made to the importance of this question of uniformity in various connections, *including uniformity or regularity of blast volume, irrespective of furnace pressure or resistance.* In the older practice, still prevalent in many localities, the volume of blast is varied with the furnace resistance, that is, the varying conditions within the furnace are permitted to cause lack of uniformity or irregularity in the volume of blast delivered to the furnace. This method, being contrary to the principle of uniformity of all controllable factors, is totally inapplicable to modern practice. Blowing by constant volume, irrespective of furnace resistance, is the method of operation essentially employed in modern blast furnace practice.

The actual volume of blast per minute, the number, size and length of projection of the tuyeres inside the crucible walls, the weight of coke per round of charge, the rotation of coke, ore and flux in the charge, the degree of bosh wall cooling, etc., are all operating conditions determinable, for any particular furnace and set of materials, within certain limits by experience only.

Exceptions Filed in Lake Superior Ore Rate Case

WASHINGTON, Nov. 21.—Twenty-three fundamental exceptions to the recent tentative report of Examiner Howard Hosmer of the Interstate Commerce Commission regarding proposed rates on ore from Lake Superior mines to the docks are made in a brief filed last week for the Adriatic Mining Co., et al., by Jean Paul Muller, attorney for the complainants. In the course of the brief, it is declared that the proposed rate of 82c. to Escanaba and Ashland should be according to the computation of the examiner himself, 77c., made up of a line haul rate of 72c. and a dock charge of 5c.

The brief says that the examiner, in declaring that no sufficient reason for the 5c. increase of 1921 in the line haul rate to Marquette appears on records, admits that 10c. per ton has been unlawfully collected on Ashland and Escanaba traffic and 5c. per ton on Marquette traffic. Therefore, it is said, the complainants are entitled to a reparation of at least 10c. on Ashland and Escanaba ore shipments and 5c. on Marquette ore shipments moving after Feb. 21, 1921. The brief adds:

"Furthermore, . . . complainants believe that the examiner has erred in permitting the Old Range carriers to retain 5c. of the arbitrary 1921 increases by the device of separate consideration of the dock charge, condemned in the Newport case."

Chamber of Commerce Southern Tour

A tour of six leading cities in Texas and Louisiana is being made by the officers and members of the board of directors of the Chamber of Commerce of the United States. The occasion is the final 1922 meeting of the board, which will be held in Galveston, on Nov. 23 and 24. The cities included in the tour, which started Nov. 19 at St. Louis, are Dallas, Fort Worth, San Antonio, Houston, Galveston and New Orleans.

The board of directors consists of upward of fifty members named to represent the various parts of the country and the different business interests. Among these are: Homer L. Ferguson, president Newport News Shipbuilding & Dry Dock Co., Newport News, Va.; William Butterworth, president Deere & Co., Moline, Ill.; A. B. Farquhar, president A. B. Farquhar Co., Ltd., York, Pa.; L. S. Gillette, president Plymouth Investment Co., Minneapolis, Minn.; Harry A. Black, president Black Hardware Co., Galveston, Tex.; Max W. Babb, vice-president Allis-Chalmers Mfg. Co., Milwaukee; George P. Blow, chairman of board Western Clock Co., LaSalle, Ill.; A. J. Brosseau, president International Motors Co., Allentown, Pa.; Frederick C. Richmond, president F. C. Richmond Machinery Co., Salt Lake City, Utah; Alvan T. Simonds, president Simonds Mfg. Co., Fitchburg, Mass.

Sales of oak leather belting for October are reported at 499,943 lb. valued at $861,902, or an average of $1.72 per lb. This represents returns from about 60 per cent of the industry. The figures show a moderate gain from September and a heavy gain from a year ago. The figures for September were 475,380 lb. and $797,213, or an average of $1.68 per lb., while in October, 1921, the figures were 299,867 lb. and $501,379, an average of $1.67 per lb.

Discuss Waste at Industrial Conference

Wasteful industrial habits, the loss of production caused by ill health, physical defects and industrial accidents were among the topics discussed by L. W. Wallace, executive secretary, Federated American Engineering Societies, in an opening address of the sixth annual New York State Industrial Conference, held in Buffalo, Nov. 21, 22 and 23.

Serious time-labor loss because of defective vision and the fatigue produced thereby was pointed out. "It is estimated," Mr. Wallace said, "that 25,000,000 workers have vision which requires correction. A large rubber company and a typewriter company found that 20 per cent of their inspectors were unable to see sufficiently well to locate defects."

The twelve-hour day and the seven-day week were classed as wasteful industrial habits by Mr. Wallace, who cited the findings of the committee on work-periods in continuous industry of the Federated American Engineering Societies and the observations and experiences of John D. Rockefeller, Jr.

Mr. Wallace held management responsible for conditions which slowed down production and produced increased cost, hardships and labor unrest. Cancellation of orders and the return of goods he characterized as vicious practices hindering stabilization. He commended Mr. Hoover's plan for an authoritative national information agency to aid managers of industry and commerce. High labor turnover he called another indictment of management. He advocated systematic and permanent study of the unemployment problem, ascribing to intermittent employment great waste. Both management and labor, he charged, were guilty at times of criminal restriction of production, individually and collectively.

R. H. Sweetser Addresses Cincinnati Engineers

Ralph H. Sweetser, vice-president of the American Rolling Mill Co., Columbus, Ohio, was the principal speaker before a joint meeting of the Cincinnati Section of the American Society for Steel Treating and the Engineers' Club Nov. 16. Mr. Sweetser described the making of pig iron from the raw materials to the finished product.

At the meeting, George W. Galbraith, E. A. Muller, F. W. Willey, O. F. Sheppard, F. C. Broeman and Julian A. Pollak were nominated as candidates for directors of the Engineers' Club for the three year term. Resolutions of condolence on the death of Charles S. Gingrich, sales engineer of the Cincinnati Milling Machine Co., and a prominent member of the club, were adopted.

Conference of Indiana Foundrymen

The conference of Indiana foundrymen to be held under the direction of the department of practical mechanics of the engineering extension service of Purdue University, on Nov. 23 and 24, at Lafayette, Ind., provides for sessions on the morning, afternoon and evening of Nov. 23, a session on the morning of Nov. 24 and an inspection of the taking of a gray iron heat by the students in foundry practice in their regular work. The purpose of the conference is to bring the foundrymen of Indiana together for the betterment of foundry interests. Among the addresses scheduled are the following:

"Foundry Conditions in Indiana," by R. E. Wendt, Lafayette, instructor in foundry practice; "Layout and Design of a Modern Foundry," by F. D. Chase, F. D. Chase, Inc., Chicago; "The Manufacture of Pig Iron," by H. B. Northrup, Diamond Chain & Mfg. Co., Indianapolis; "The Manufacture of Malleable Iron," by N. W. Waterbury, Link-Belt Co., Indianapolis; "Team Work in Your Industry," by A. J. Tuscany, secretary Ohio State Foundrymen's Association, Cleveland, with a discussion led by A. J. Rumely, La Porte Foundry & Furnace Co., La Porte, Ind.; "Warpage in Iron," by J. F. Keller, iron and steel specialist, Lafayette; "Metallurgy in the Foundry," by J. H. Hopp, C. C. Kawin Co., Chicago; "Why Research Pays," by H. C. Peffer, School of Chemical Engineering, Lafayette; "Foundry Costs," by E. T. Runge, E. T. Runge Cost Co., Cleveland.

Meeting of Ohio State Foundrymen's Association

Plans have been completed for the convention and annual meeting of the Ohio State Foundrymen's Association at Middletown, Ohio, Dec. 7 and 8. The headquarters will be at the Hotel Manchester, where luncheon will be served at 11 a. m. Dec. 7. This will be followed by a business session. At 7 p. m. there will be an informal banquet followed by an entertainment. The morning of Dec. 8 will be spent in inspecting the plant of the American Rolling Mill Co., where the foundrymen will be entertained at luncheon. During the afternoon, they will be taken on an automobile trip to Cincinnati, where they will be entertained by Cincinnati foundrymen.

New Officers of New York Electrochemists

At the meeting of the New York section of the American Electrochemical Society, at the Chemists' Club, New York, Nov. 17, Dr. E. P. Mathewson gave an illustrated talk on mining and living conditions in Burma as he encountered them during his recent visit there. Dr. Mathewson outlined briefly the various metallurgical steps involved in the treatment of complex sulphide ores. These ores contain not only silver and lead, but also zinc and copper. C. H. Davis, of the American Brass Co., described his improved method of spectrum analysis. Traces of impurities in copper, brass, zinc and German silver can be detected in very short order, using a few milligrams of the material.

At the conclusion of the technical program, election of officers of the section took place. Dr. H. C. Cooper, 38 Clinton Street, White Plains, N. Y., was elected chairman; Dr. James Kendall, of Columbia University, vice-chairman; Paul DeV. Manning, 2 Hector Street, New York, secretary. The next meeting of the section will be held on the evening of Feb. 9, at the Chemists' Club.

Ohio Foundry Operations

Operations of Ohio foundries fell out slightly during October, having declined to 61.4 per cent of normal on Oct. 31, as compared with 63 per cent on Sept. 30, according to the monthly report of the Ohio State Foundrymen's Association. This decline is attributed partially to the seasonal slowing up of the automobile industry which has affected some foundries. Pig iron stocks on hand increased during October from 75 to 84 per cent, and stocks received increased from 35 to 47 per cent. The association finds that the softening of pig iron prices has resulted in the tendency on the part of buyers of castings to withhold the placing of contracts because they expect lower prices on castings. Operations of non-ferrous foundries show considerable improvement, having increased from 65 per cent of normal during September to 74 per cent during October.

Foundry Meeting at Milwaukee

The Wisconsin Foundrymen's Association has arranged with the Bethlehem Steel Co. to have its foundry expert, Mr. Kreulen, address the association in open meeting, at the Hotel Pfister, Milwaukee, on Nov. 28. The latter part of the evening will be devoted to a general discussion of foundry problems. Admission cards can be obtained gratis from the secretary, J. L. Wurm, 283 Clinton Street, Milwaukee. William J. Grede is president.

Co-ordination of the country's transportation facilities, including railroads, water routes and highways, will be a prominent part of the program of the Southern Commercial Congress in convention this week at Chicago.

Effect of Manganese on Carbon Steels

Their Structure As Affected by Varying Percentages—Manganese As a Strengthening Factor in Low and Medium Steels

BY HENRY S. RAWDON* AND FREDERICK SILLERS, JR.*

ALTHOUGH the influence of manganese as a "hardening element" of steel, in addition to its action as a deoxidizing and as a "desulphurizing agent, is well understood by metallurgists, it is doubtful whether its behavior in this respect is fully appreciated by designing engineers and users of steel in general. In a previous publication of the Bureau of Standards[1], the preparation of a series of iron-carbon-manganese alloys has been described, together with their utilization for the determination of the specific effect of carbon and of manganese upon the mechanical properties of such alloys.

The scope of the present article is restricted to a discussion of the structural effects resulting from variations in the manganese content and is based upon a study of the alloys prepared in the former investigation. These alloys were of a very high degree of purity. The materials used in their preparation were electrodeposited iron, manganese of 98.75 per cent purity and an iron-carbon alloy (4.5 per cent carbon) prepared from Acheson graphite and some of the electrodeposited iron. Crucibles of fused magnesia, prepared especially for this investigation, were used for containing the alloys during the melting which was carried out in vacuo. The following figures show the maximum impurities in any of the finished alloys: Sulphur, 0.008; silicon, 0.008; nickel, copper, and cobalt (combined) 0.014 per cent.

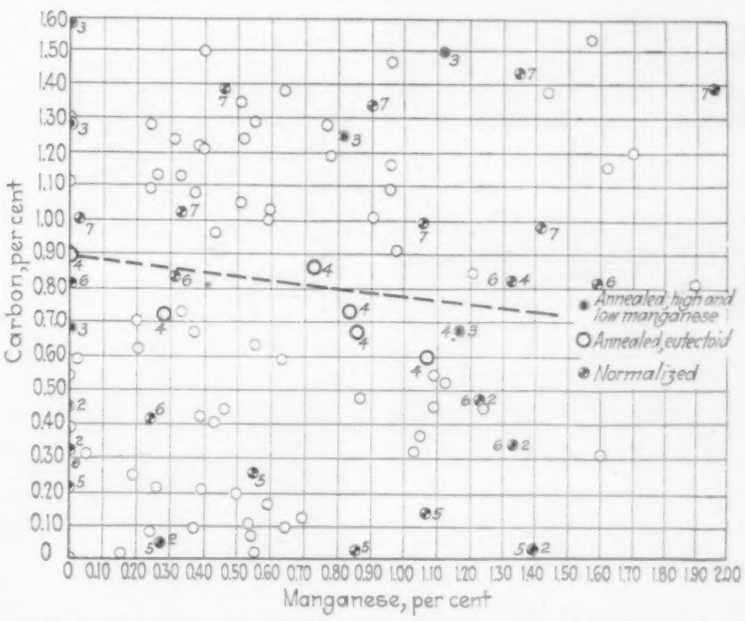


Fig. 1.—The Alloys Available for Examination Grouped According to the Respective Carbon and Manganese Contents

The conclusions reached by Neville and Cain, as a result of their investigation of the series of iron-carbon-manganese alloys prepared from pure materials, concerning the effect of residual manganese upon the tensile properties and hardness may be summarized as follows:

> The effects of carbon and of manganese are mutually dependent upon each other; the presence of carbon augments the influence of manganese, and vice versa. The ultimate tensile strength of the alloys was found to increase by an amount varying from 90 to 250 lb. per sq. in. for each addition of 0.01 per cent manganese, the lower rate of increase being for the alloys of low carbon content. The proportional limit was found to be affected in much the same way as the ultimate tensile strength by variations in the manganese, whereas the ductility was only slightly affected. The average increase in the Brinell hardness number for each 0.01 per cent addition of manganese is 0.5, though for low carbon alloys it is somewhat less than this value.

As illustrative of the effects of manganese upon the mechanical properties of commercial carbon steels in the normalized state, the values in Table 1 given by Aitchison[2], may be cited.

The general effect of manganese upon the structure, and hence the properties, of carbon steels has been well expressed by Howe[3] as follows:

> Its effect on the mechanical properties of the steel seems to me in the last analysis due primarily to its retarding action on the transformations and on the coalescence of the microconstituents into progressively coarser masses. . . . The retarding effect on the structural changes shows itself by leading in general (in carbon steels) to finer structure, finer ferrite masses, finer network structure, and finer pearlite; indeed, probably often to the replacement of lamellar pearlite with sorbite. This greater fineness leads to better quality in general and to a higher elastic limit in particular, though, of course, with a corresponding sacrifice in ductility. The great value of manganese for this purpose has not begun to receive the attention it deserves.

Table 1.—Effect of Manganese on Physical Properties of Steel

Carbon, Per Cent	Manganese, Per Cent	Yield Point, Lb. per Sq. In.	Maximum Tensile Strength, Lb. per Sq. In.	Elongation, Per Cent
0.21	0.05	38,100	56,000	42.0
0.25	0.85	56,000	60,500	30.0
0.38	0.08	44,800	67,200	35.0
0.36	0.58	58,300	78,400	28.0
0.37	0.82	60,500	96,300	25.0
0.49	0.09	49,300	80,600	27.0
0.47	0.70	65,000	94,100	26.0
0.50	0.80	67,200	112,000	20.0

The series of iron-carbon-manganese alloys available offered an excellent opportunity for studying the structural changes in carbon steels which result from manganese, a study which on account of the dearth of information along this line in the technical literature, is very desirable. Although the alloys belong to the ternary system, the most convenient and practical way to treat them so far as their relation to steel is con-

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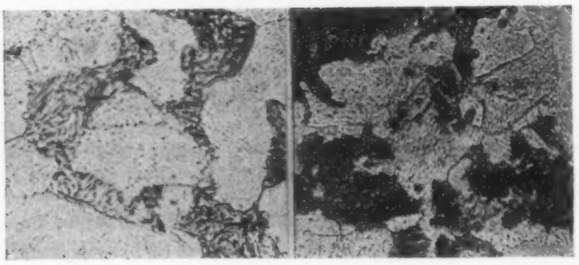
[1] R. P. Neville and J. R. Cain: "The Preparation and Properties of Pure Iron Alloys; I, The Effect of Carbon and Manganese on the Mechanical Properties of Pure Iron. Bureau of Standards Scientific Paper, forthcoming, 1922. The paper contains a rather complete bibliography on the effect of manganese on carbon steels.

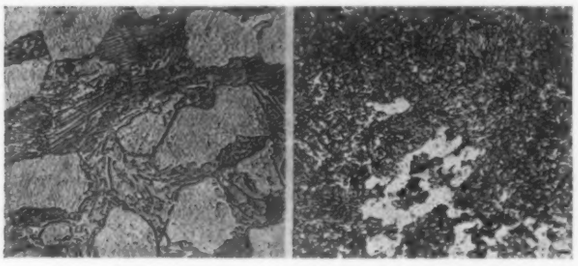
[2] L. Aitchison, "Engineering Steels," p. 143, D. Van Nostrand Co. (1922).

[3] H. M. Howe: Topical Discussion on the Rôle of the General Alloying Elements in the Alloy Steels. The Rôle of Manganese; A. S. T. M. *Proceedings*, vol. 17, p. 5, 1917.

C., 0.05; *Mn.*, 0.27; *Brinell hardness*, 72 — *C.*, 0.02; *Mn.*, 1.39; *Brinell hardness*, 85



C., 0.32; *Mn.*, 0.003; *Brinell hardness*, 92 — *C.*, 0.33; *Mn.*, 1.33; *Brinell hardness*, 134



C., 0.45; *Mn.*, *trace;* *Brinell hardness*, 105 — *C.*, 0.46; *Mn.*, 1.23; *Brinell hardness*, 164

Fig. 2.—Microstructure of Annealed Alloys of Similar Carbon Content with Low and with High Manganese. Note the pronounced difference in the character of the pearlite which results from an increase in the manganese content. Reduced about one-fourth from an original of 500 dia.

cerned, is to regard them as belonging to the binary or iron-carbon series, with manganese as an extraneous or added element. This is the general method used in the following discussion.

The Materials Used

Composition: In Fig. 1 are indicated the alloys available for examination, grouped according to the respective carbon and manganese contents. One hundred and two (102) alloys with carbon varying from 0 to 1.6 per cent and manganese 0 to 2.0 per cent were used. Although the structures of all of the specimens shown were examined, photomicrographs of only a few have been reproduced as types in the following discussion. Such specimens have been suitably indicated in Fig. 1 and the carbon and manganese content given on the respective micrographs in the different figures. The results of the complete chemical analysis of all the specimens are given in the reference cited in note 1.

Treatment: In the previous investigation, all of the specimens were heat treated before being tested. This treatment varied somewhat according to the composition of the alloy, the aim being to develop the highest tensile properties in the normalized condition. On account of the relatively small size of the ingots, approximately 8 x 1½ in., the reduction during the mechanical working of the metal was not sufficient to remove entirely the "ingot structure." Hence a preliminary annealing was given all of the specimens after being cut from the rolled plate in order to minimize any possible ingotism remaining. The bars were heated for two hours at the annealing temperature, which was varied according to carbon content, as follows: Carbon, 0 to 0.09 per cent, 940 deg. C.; 0.10 to 0.29 per cent cent, 900 deg. C.; 0.30 per cent, 840 deg. C., after which they were allowed to cool in the furnace.

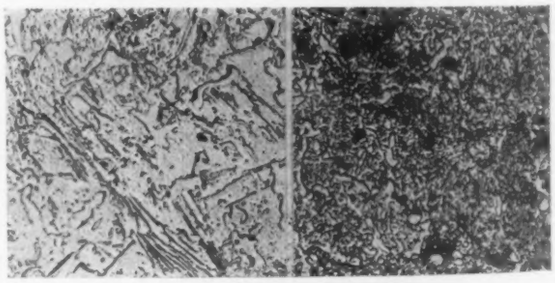
In carrying out the normalizing treatment which followed the preliminary annealing, allowance was made for the differences in both carbon and manganese contents. The treatments are summarized in Table 2.

Table 2.—Normalizing Treatment
(20 min. at required temperature, followed by air-cooling)

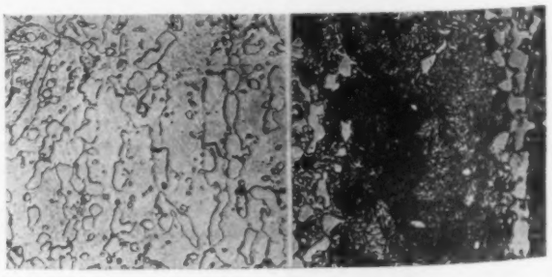
Carbon, Per Cent	Temperature, Deg. C., According to Manganese Content: Manganese, 0 to 0.79 Per Cent	Manganese, 0.80 to 1.50 Per Cent
0.00–0.09	940	915
0.10–0.19	915	885
0.20–0.29	885	860
0.30–0.44	845	830
0.45–0.59	815	800
0.60–0.74	785	785
0.75–1.50	770	770

In addition to examining all the specimens in the normalized condition, many of them were re-examined after a second or supplementary annealing. Small pieces approximately 15 g. in mass, cut from the ends of broken tension specimens were packed in an iron container (section of 3-in. pipe) covered with amorphous silica containing a small amount of charcoal and heated to a temperature of approximately 750 deg. C. (745 to 765 deg.). After a sojourn of one hour at this temperature the container and specimens were allowed to cool rather slowly within the furnace, one hour being required for the temperature to drop from 750 to 600 deg. C. In this examination, since all of the specimens had received identical treatments, the effect of the manganese upon the structure was much more evident and permitted closer comparison than in the same samples after the normalizing treatment.

C., 0.68; *Mn.*, *trace;* *Brinell hardness*, 147 — *C.*, 0.67; *Mn.*, 1.17; *Brinell hardness*, 225

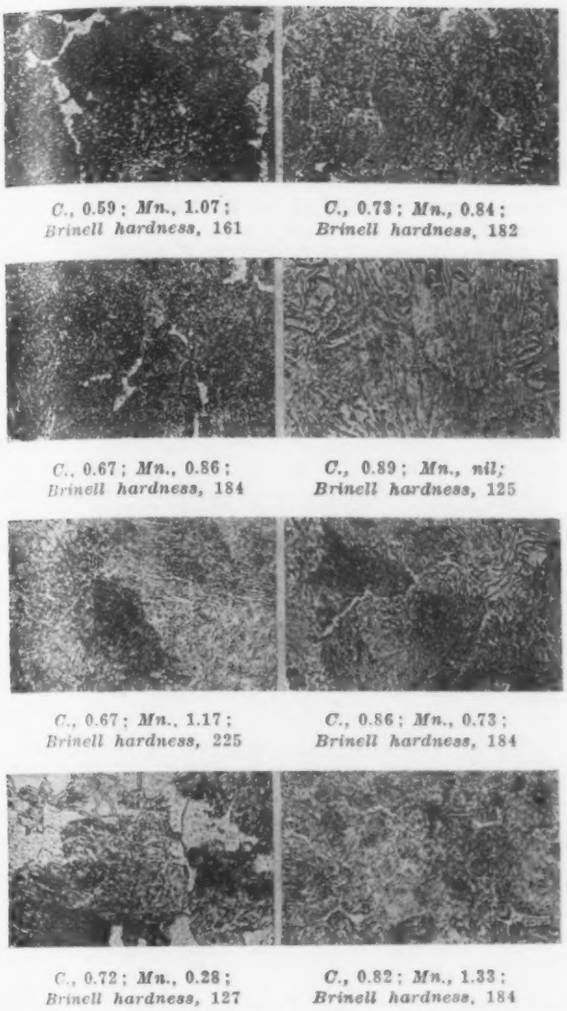


C., 1.28; *Mn.*, *nil;* *Brinell hardness*, 125 — *C.*, 1.25; *Mn.*, 0.82; *Brinell hardness*, 154



C., 1.58; *Mn.*, 0.004; *Brinell hardness*, 146 — *C.*, 1.50; *Mn.*, 1.13; *Brinell hardness*, 171

Fig. 3.—Microstructure of Annealed Alloys Showing the Changes Resulting from Variations in the Manganese Content in Specimens of Similar Carbon Content. Reduced about one-fourth from an original of 500 dia.



C., 0.59; *Mn.*, 1.07; *Brinell hardness*, 161 — *C.*, 0.73; *Mn.*, 0.84; *Brinell hardness*, 182

C., 0.67; *Mn.*, 0.86; *Brinell hardness*, 184 — *C.*, 0.89; *Mn.*, *nil*; *Brinell hardness*, 125

C., 0.67; *Mn.*, 1.17; *Brinell hardness*, 225 — *C.*, 0.86; *Mn.*, 0.73; *Brinell hardness*, 184

C., 0.72; *Mn.*, 0.28; *Brinell hardness*, 127 — *C.*, 0.82; *Mn.*, 1.33; *Brinell hardness*, 184

Fig. 4.—Microstructure of Annealed Alloys of Approximately Eutectoid Composition Showing the Changes Resulting from Variations in Manganese Content. See Fig. 1 for the location of eutectoid line. Reduced about one-fourth from an original of 500 dia.

Structural Feature from Variations in Mangenese

Annealed Alloys: In Figs. 2 and 3 are shown the structures of a series of alloys of progressively increasing carbon contents, each one of which occurred in combination with a low and a high manganese content (See Fig. 1). The characteristic influence of the manganese in the steel which resulted in the pearlite being in a fine grained sorbitic state rather than in the coarser lamellar condition is very evident in these micrographs. The general appearance of the alloys of high manganese content is similar to that which would result in the companion, that is, the low-manganese, alloy if it were cooled at a much more rapid rate than was used here.

The results obtained with the annealed alloys indicated that manganese has very little if any effect upon the grain size of the annealed material. This conclusion is not in entire agreement with that reached by Howe[1], that manganese decreases the size of the austenite crystals and therefore the size of ferrite network in the annealed steel resulting from them. However, as will be shown later, steels of high manganese content when cooled at a more rapid rate, for example in normalizing, often are of a much finer grain structure than steels of similar carbon content but lower in manganese. This is the condition which obtains more frequently in commercial steels than that shown by the slowly cooled alloys in Figs. 2 and 3, and hence, may account for the conclusion reached by Howe concerning the effect of manganese upon grain size.

As an indication of the effect of manganese upon the mechanical properties of the alloys in the annealed state, the Brinell hardness was determined, a "micro-Brinell" set, which employs a 1/16 in. diameter (1.58 mm.) ball and a 15 kg. load, being used. The results are summarized in Table 3, and the hardness has also been indicated on the micrographs of these alloys.

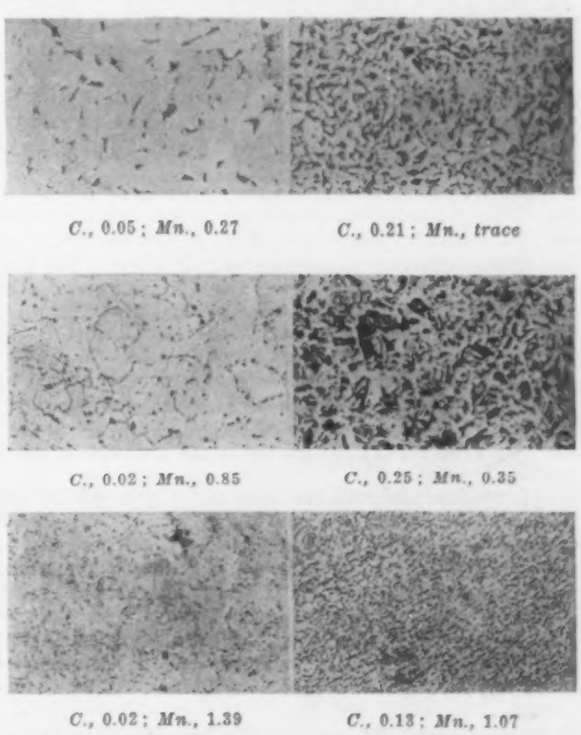
[1] See Note 3, also H. M. Howe, "Life History of Network and Ferrite Grains in Carbon Steel," A. S. T. M. Proc., 11, p. 365, 1911.

Table 3.—Effect of Manganese on the Brinell Hardness of the Annealed Alloys

Carbon, Per Cent	Manganese, Per Cent	Brinell Hardness Number
0.05	0.27	72
0.02	1.39	85
0.32	0.003	92
0.33	1.33	134
0.45	Trace	105
0.46	1.23	164
0.68	Trace	147
0.67	1.17	225
0.67	0.86	184
0.59	1.07	161
0.72	0.28	127
0.86	0.73	184
0.82	1.33	184
0.89	Nil	125
0.73	0.84	182
1.28	Nil	125
1.25	0.82	154
1.58	0.004	146
1.50	1.13	171

Change in Eutectoid Ratio: In addition to the difference in the character of the pearlite resulting from the presence of manganese another noticeable structural change is the decrease in the amount of precipitated proeutectoid ferrite in all of the alloys containing manganese. This condition implies a change in the eutectoid ratio, the "pearlite point" being gradually shifted to the left, that is, to lower carbon percentages, by the addition of manganese. Further substantiating evidence of this is afforded by the fact that free cementite may be detected in alloys containing considerable manganese but with a carbon content somewhat below the eutectoid composition of the simple iron-carbon alloys (Fig. 4).

By the examination of a series of annealed specimens of approximate eutectoid composition the location of the apparent eutectoid line was determined and has been indicated in Fig. 1. Fig. 4 shows the microstructure of the series of eutectoid alloys examined after annealing. The presence of free ferrite or cementite is



C., 0.05; *Mn.*, 0.27 — *C.*, 0.21; *Mn.*, *trace*

C., 0.02; *Mn.*, 0.85 — *C.*, 0.25; *Mn.*, 0.35

C., 0.02; *Mn.*, 1.39 — *C.*, 0.13; *Mn.*, 1.07

Fig. 5.—Microstructural Changes Produced by Variations of the Manganese Content of Normalized Alloys of Low Carbon Content. Note the decrease in grain size with increasing manganese. Reduced about one-fourth from an original of 100 dia.

the criterion used in reaching a decision as to upon which side of the line the alloy should be placed. By this means the dotted line shown in Fig. 1 was located. This indicates that one per cent of added manganese lowers the eutectoid ratio to approximately 0.78 per cent carbon.

The line as drawn represents the structural conditions which obtain under ordinary circumstances. The exact or theoretical location of the line is a matter of considerable uncertainty since the degree of annealing would have to be varied to suit the variations in manganese content of each of the different alloys.

Normalized Specimens: From the numerous specimens examined in the normalized condition, a few typical samples of the various grades according to carbon content, were selected, micrographs of which have been given in Figs. 5, 6 and 7. In addition to the characteristic effect of manganese upon the nature of the pearlite, which was even more evident here than it was in the annealed specimens, these micrographs indicate that the grain size of hypoeutectoid steels when cooled fairly rapidly, that is, normalized, is apparently considerably less in those of high manganese content than in similar ones lower in manganese. The ferrite masses in the steels of high manganese content are much smaller and the continuity of the pearlite grains is broken up much more effectively than in the similar steels of lower manganese content.

In the high carbon steels, an increase in manganese content leads to formation of cementite in excess of that which normally occurs in simple carbon steels of the same carbon content. Instead of the well defined plates, in which form cementite often appears in high carbon steels, manganese causes this constituent to occur in very much smaller masses or granules. In some of the specimens prominent well-defined streaks of cementite were found. It is believed, however, that this structural feature was a result of the small-scale production used in the preparation of these alloys and that it may not be a characteristic effect of manganese in general.

Discussion

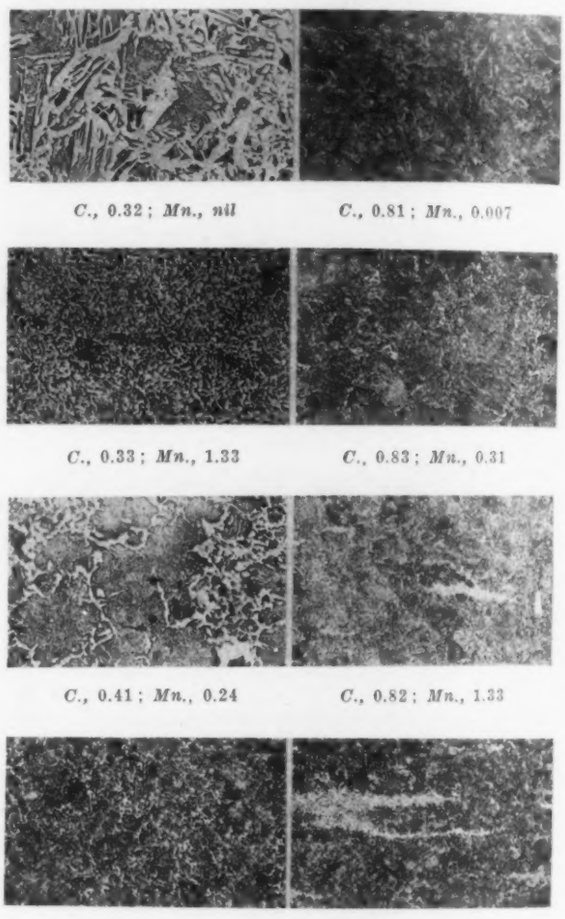
The effect of manganese in lowering the critical or the transformation temperatures of steel is well known. The magnitude of this effect upon the Ar_1 transformation in iron-carbon alloys (4 per cent carbon or above) has been stated by Wust[6] to be 20 to 25 deg. C. for each per cent of manganese added provided the total amount is not in excess of 5 per cent. The more recent investigation by Matsushita[7] of low carbon steels (approximately 0.21 per cent carbon) indicates the lowering of the Ar_1 temperature for each per cent of added manganese, up to a total of 9.8 per cent of this element, to be slightly less than 20 deg.

The structural changes in the character of the pearlite of the alloys previously described can, in large measure, be accounted for by the effect of this element upon the transformation temperatures. However, the fact that all elements which lower the Ar_1 transformations in steel do not produce the same change in structure of the annealed pearlite indicates that the result is dependent to some extent upon other factors. This characteristic effect of manganese has been well stated by Howe (see note 5) as follows: "Sluggishness from lowering the birth-temperature of ferrite and pearlite reinforces sluggishness due directly to the presence of manganese."

Manganese and iron are completely isomorphous and hence form a continuous series of solid solutions. In the ternary iron-carbon-manganese alloys of low carbon content it is probable then that at least part of the manganese exists in solid solution in the ferrite. Manganese also reacts with carbon to form a carbide corresponding to cementite so that in the alloys of higher carbon content it may be expected that the manganese exists in the form of carbide. Whether a double carbide of iron and manganese or a mixture of the simple carbides of the two elements exists is still an open question.

Although each of these two factors, the solution of manganese in ferrite and the presence of a special carbide of this element, undoubtedly has an effect upon the mechanical properties of the steel, it appears very probable that the structural effect resulting from the presence of manganese is of much greater importance in this respect.

An indication of the magnitude of the effect resulting from the solution of manganese in ferrite is given by the very low-carbon alloys in Table 3. It will be noted that the increase in hardness produced by manganese in this case was very much less than in those in which



C., 0.32; *Mn.*, *nil* *C.*, 0.81; *Mn.*, 0.007

C., 0.33; *Mn.*, 1.33 *C.*, 0.83; *Mn.*, 0.31

C., 0.41; *Mn.*, 0.24 *C.*, 0.82; *Mn.*, 1.33

C., 0.46; *Mn.*, 1.23 *C.*, 0.81; *Mn.*, 1.59

Fig. 6.—Microstructural Changes Produced by Variations in the Manganese Content of Normalized Alloys of Medium and of Eutectoid Carbon Content. Note the change in grain size of the medium carbon alloys. Reduced about one-fourth from an original of 100 dia.

more carbon was present and hence a greater structural difference existed between the low and high manganese alloys.

Concerning the effect of manganese upon the grain size of steel, conflicting statements have appeared in the technical literature. Howe (see note 3) attributed much of the beneficial effect of manganese in low carbon steels to a decrease in the grain size resulting from the presence of this element. Hoyt[8] states that no marked difference in ferrite grain size results from the presence of manganese in steel. The results obtained in this investigation indicate that the rate at which the steel is cooled is a very important factor in this respect. In the annealed alloys of high and low manganese content no noticeable difference in grain-size could be detected. However, in the same or similar alloys which had been given a normalizing treatment and hence cooled much more rapidly the difference in grain size was very marked, the grain-size being very much less

[6] F. Wust: "Beitrag zum Einfluss des Mangans auf die System Eisen-Kohlenstoff"; *Metallurgie*, 6, p. 3 (1909).

[7] T. Matsushita: "Influence of Manganese on the Physical Properties of Carbon Steels," *Science Reports*, Tohoku University, Sendai, Japan; 8, p. 79 (1919).

[8] S. L. Hoyt: "Metallography; Part II, The Metals and Common Alloys," 1921, p. 340.

in those containing the higher percentages of manganese. The marked difference in Brinell hardness observed in the high and low manganese alloys after annealing indicates, however, that any increase in the mechanical properties as a result of the decreased grain size in the materials of relatively high manganese content is in addition to the effects which are induced directly by the presence of manganese.

Another effect of manganese in steels is the shift in the eutectoid ratio toward the left of the diagram, that is, to a lower percentage of carbon. An addition of 1 per cent of manganese in the iron-carbon alloys examined, lowered the eutectoid ratio to approximately 0.78 per cent carbon. This change is considerably greater than the value quoted by Hoyt (see note 8), a lowering to 0.75 per cent carbon for 2 per cent manganese being given by him. The very fine grained or sorbitic character of the pearlite in alloys containing considerable manganese together with the ready tendency toward spheroidization of the lamellar pearlite of manganese-free alloys renders the location of the eutectoid line a matter of considerable uncertainty. By cooling the manganese alloys from the annealing temperature at a very much slower rate than the one employed, this line might be located somewhat more accurately. However, the position given in the diagram (Fig. 1) represents very closely the conditions which obtain in commercial practice.

One other practical effect of manganese in steel as indicated by the foregoing micrographs is the decrease in spheroidization of the cementite. The large amount of cementite remaining in the sorbitic condition in the high carbon alloys containing considerable manganese is a very conspicuous feature of the structure as compared with similar low-manganese alloys which received the same treatment.

The value of manganese as a strengthening element in carbon steels, particularly in those of low-carbon content, has been emphasized by prominent metallurgists, for example Howe, and to some extent such steels are now used commercially, especially abroad. While the results of structural examination alone, such as this article describes, will not permit of any definite recommendation in this respect, it is very evident from the results described above that by the use of higher manganese contents than are usually employed, a structural condition may be obtained in low and medium carbon steels which is very much more desirable than that which obtains in a similar steel but of lower manganese content after having received an identical treatment. The results strongly support the recommendations which have been made at different times concerning the advantages to be gained by using higher manganese in such steels.

Summary

1. The investigation, which is part of the general study of the iron-carbon-manganese alloys which is being conducted by the Bureau of Standards, consisted of a study of the microstructure of a comprehensive series of these alloys. One hundred and two alloys with the carbon varying from 0 to 1.60 per cent and manganese 0 to 2 per cent were used.

2. The effect of manganese as observed in annealed alloys, is to confer upon the pearlite a very fine grained or sorbitic structure, even after slow cooling. The relative amount of pearlite present is considerably greater in the alloys of high manganese content than in corresponding ones low in this element. A pronounced increase in Brinell hardness of the annealed alloys accompanies the change in structure produced by the addition of manganese.

3. The addition of manganese causes a shift in the eutectoid ratio toward lower carbon content. One per cent of manganese lowers it to approximately 0.78 per cent carbon.

4. In the normalized alloys, a pronounced decrease in grain size was found in those of higher manganese contents, in addition to the structural effects mentioned above. In the annealed specimens no noticeable difference in grain size was detected for high and low manganese content in alloys of any given carbon content.

5. The well known effect of manganese in lowering the transformation temperatures of the materials will account in part for the observed structural changes. It appears also that manganese renders steel more "sluggish" and less responsive to structural changes than many of the other elements which produce a similar lowering of the critical temperatures.

6. While the results of the structural examination will not warrant any definite conclusions concerning the use of manganese as a strengthening element in steel, the results obtained strongly support previous recommendations which have been made by different metallurgists concerning the advantages to be gained from the use of higher manganese, particularly in low and medium carbon steels.

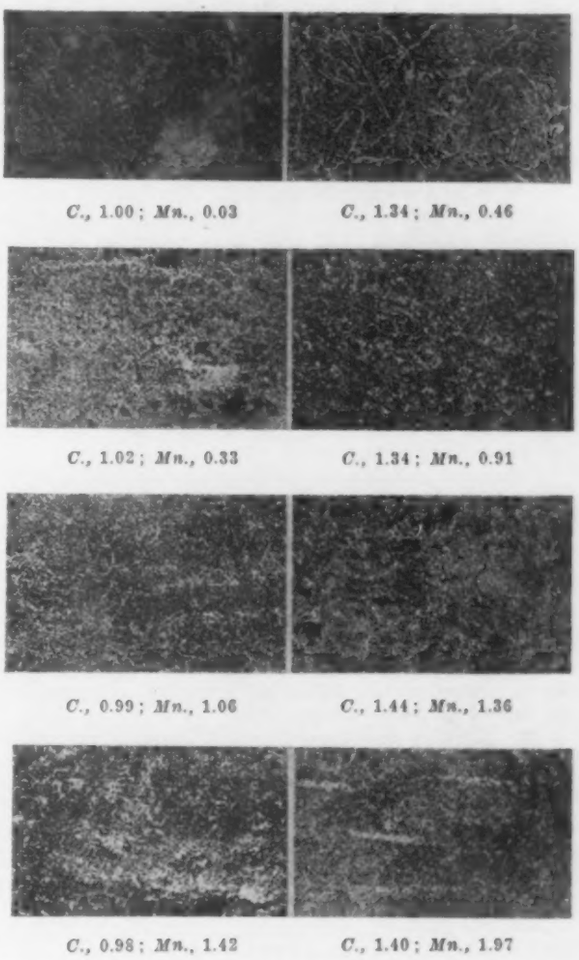


Fig. 7.—Microstructural Changes in Normalized High Carbon Alloys Resulting from Variations in the Manganese Content. Note the gradual increase in amount and change in character of the cementite. Reduced about one-fourth from an original of 100 dia.

Purchasing Agency Will Move from Washington to Chicago

WASHINGTON, Nov. 21.—Announcement has been made by J. W. Cain, manager of purchases, American Short Line Railroad Association, that its consolidated purchasing agency will be removed, effective Dec. 1, from Washington to 616-618 Railway Exchange, Chicago. The reason assigned is that business now being handled by the agency has increased to such proportions that it has been found necessary to be more centrally located, both geographically and industrially. The association also is completing plans for a finance corporation through which gasoline passenger motor cars may be acquired by member lines and others under a lease purchase contract. It is believed that this will be a great help to a large number of railroad companies, which have found difficulty in financing the purchase of motor equipment on this basis.

FAVORS SHIP SUBSIDY

Mr. Schwab Speaks Earnestly in Support of Upbuilding the Merchant Marine

WASHINGTON, Nov. 21.—Before he took the stand last Friday morning to testify in the Pittsburgh base case, Chairman Charles M. Schwab of the Bethlehem Steel Corporation was, as is always the case when occasion permits it, surrounded by newspaper correspondents. He was in his usual happy mood and talked to the newspaper men freely about current topics. In the course of his remarks, he took occasion to strongly support ship subsidy legislation. He said that he could not understand why the farmers objected to it, because it is as important to them as it is to the manufacturing interests on the seaboard. He said that it is necessary that this country build up its own merchant fleet and that to do so a subsidy is required. Mr. Schwab pointed out that foreign countries have built up their merchant fleets on this basis and that it is essential for the United States to do likewise.

It was declared by Mr. Schwab that immediate passage of the ship subsidy bill would give a strong impetus to American business. Deploring the lack of American vessels that existed until their construction was forced by the war, Mr. Schwab said that the Bethlehem corporation was compelled to give contracts abroad to foreign ships to carry iron ore, because there were no American ships available.

"It is not possible for us to compete with the commerce of the world on the same footing," he said, "unless we get our shipping on the same basis as theirs. We are the workshop of the world. We are the foodshop of the world. And it is nothing less than absurd not to help our own ships in getting a fair share of the world's commerce. The margin between good business and bad business is only a few per cent. Exports can furnish this margin, and a strong and resourceful merchant marine would make a tremendous difference in the aspect of American business."

Mr. Schwab said that although business conditions in the United States and throughout the world are unsettled, there is no obligation on the part of the United States to call any world economic conference. He expressed firm belief in the principles laid down by the founders of this country in opposition to entangling alliances with foreign countries. Pointing out that this nation has vast natural resources, which should be turned into gold, Mr. Schwab said that while he believed the United States should adopt a helpful attitude toward other nations, he did not believe that it should be held responsible for world conditions.

Lackawanna Building Plans

BUFFALO, Nov. 20.—Charles M. Schwab, chairman Bethlehem Steel Corporation and President E. G. Grace, inspected the Lackawanna mills last Tuesday. Mr. Schwab stated that in line with the expenditure of $15,000,000 at Lackawanna, would be included the erection of more than 1000 dwellings for the workers. He expressed confidence in the future of the Lackawanna properties.

Specifications for Safes Considered

WASHINGTON, Nov. 21.—The tentative draft of the standard specifications for fireproof safes to be furnished to the Government was discussed at a meeting at the Bureau of Standards last Friday with representatives of safe manufacturers. The preparation of these specifications is in charge of a committee of the Federal Specifications Board, Bureau of the Budget, which prepares tentative specifications and then invites manufacturers' representatives to express their opinion. After careful consideration of all points of view these specifications are adopted and are then mandatory on all Government departments.

Fireproof safes, by these specifications, are divided into four classes, depending on the severity of the fire they will be expected to withstand. The meeting was taken up with a discussion of the requirements of the four types of safes and with various details of construction.

All manufacturers will be invited to submit bids on the basis of these specifications and the successful competitor will be awarded the contract for all Government purchases of safes of that type for one year only. Tentative specifications will be revised and copies of the plans sent to manufacturers for their criticism.

Increasing Output of Coal

WASHINGTON, Nov. 21.—Returns on carloadings at mines for the week Nov. 13-18 indicate 13,200,000 net tons of coal were produced, according to the Geological Survey. Of this quantity 11,100,000 tons was soft coal and 2,100,000 was anthracite.

The estimated cumulative production of bituminous coal this year to Nov. 11, inclusive, stands at 332,668,000 tons, which is 21,541,000 tons, or 6 per cent less than in the corresponding period of 1921; 137,385,000 tons, or 29 per cent less than in 1920; 77,734,000 tons, or 19 per cent less than in 1919; 177,534,000 tons, or 35 per cent less than in 1918, and 143,856,000 tons, or 30 per cent less than in 1917.

The cumulative output of beehive coke during 1922 to Nov. 11 stood at 6,051,000 net tons. In the corresponding period of the four years preceding it was as follows: 1921, 4,715,000; 1920, 18,462,000; 1919, 16,974,000; 1918, 27,106,000.

Continuous Annealing Furnaces for Sheets

(*Concluded from page* 1342)

which distributes the coal to steel bins near the point of consumption.

Fuel is fed to the furnaces by small screw feeders direct connected to motors, the coal being delivered into the air blast in the proper proportion. Each sheet and pair furnace has a separate 4-ton steel fuel bin located back of it along the side wall of the building. The fuel is carried underground in 3-in. feed pipes from the bins to the furnaces. Each combination furnace has one burner located at the back of the furnace. The annealing furnaces are supplied from a 20-ton fuel bin located at the side of the furnaces. Eight 1½-in. and 3-in. supply lines lead from the bin to the furnaces, each furnace having four combustion chambers beneath the floor, with one burner in each chamber.

The sheet mills are driven by a 1600-hp. 28 in. x 36 in. twin duplex condensing and reversing Uniflow engine built by the Nordberg Mfg. Co. and located between the mill stands. A 5 to 1 herringbone reduction gear supplied by the Falk Co. reduces the speed from 150 to 30 r.p.m., at which the rolls are driven. The fly wheel is 13 ft. in diameter and 28 in. wide and, with the main shaft, weighs 50 tons. The main gear is 16 ft. in diameter. A 750-hp. Uniflow engine drives a 350-kw. alternating current General Electric generator that supplies current for operating the powdered coal plant and blowers. A 175-hp. Crocker-Wheeler direct current generator furnishes electricity for the cranes and for the motors that operate the screw feeders that deliver fuel to the furnaces and a 60-kw. generator that supplies current for lighting. Steam is supplied by two 450-hp. water tube boilers built by the Union Iron Works.

The plant is located on a 50-acre site on the main line of the New York Central Railroad, assuring good shipping facilities. It has a capacity of 5000 to 6000 tons per month in black and galvanized sheets in 12 to 30 gages, and in widths to 40 in.

The Ashtabula Steel Co. was organized in 1920 by the Chamber of Commerce of that city, and its plant was placed in operation late the past summer. Robert Lock is president. Other officers include, H. M. Kunkle, treasurer; W. J. Kunkel, assistant treasurer; T. J. Rennick, secretary and Severn P. Ker, Jr., general manager of sales.

Layout for Electric Tool Steel Plant

Efficient Arrangement of Buildings and Equipment, Particularly the Melting Department—Storage of Scrap and Ferroalloys

BY MERLE W. CARUTHERS*

THE manufacture of tool steels in the electric furnace is receiving added impetus and, by the use of proper forethought in the laying out of the melting department and storage facilities, it is possible to surpass the highest efficiency previously obtained.

Of course, it is not possible to furnish any set rules that can be universally followed, but an attempt is made in the following article to present a layout that combines the good points found in a number of installations.

Steel Scrap Storage

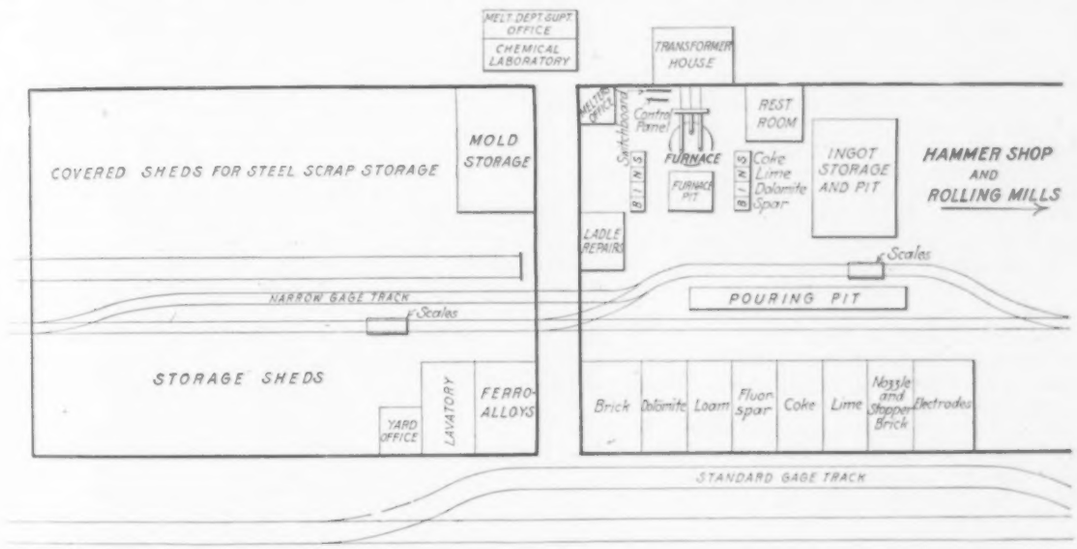
The question of storage for melting scrap is obviously an important one. It is the condition of the scrap, with regard to corrosion when charged into the furnace, which determines the amount of refining of the bath necessary, the quality of the steel produced and the life obtained from the furnace refractories. These factors, of course, govern the cost of the finished bar and their control minimize factory cost.

It is an established fact that the analysis of any tool steel does not definitely guarantee that the steel will be suited for the purpose intended even if the chemical composition required by the purchaser has been met. Quality starts farther back than the ladle tests or the check analyses taken from the finished bar by the purchaser. The selection and storage of the raw materials which go to make up the charge are important steps in the production of quality tool steel.

Covered sheds should be used for the storage of steel scrap. Excessively rusty steel not only fails to yield a proper percentage of its weight when melted, but forms a bath that is very high in oxides. These oxides should be reduced to insure the making of a sound steel in any case and, when present in large quantities, the time and materials necessary to bring about proper refinement are immoderate and consequently cause a higher priced steel without an accompanying enhancement in quality.

On the contrary, the quality is decreased by using a great quantity of highly oxidized scrap, for no matter what precautions are taken to "tap" under a high reducing atmosphere, it is practically impossible to obtain a steel free from gases and the use of rusty scrap necessarily increases the danger of getting a finished product that is not thoroughly deoxidized.

The extra precautions taken to make a fine quality steel from rusty scrap also consume extra time which could be used for increased tonnage if unrusted scrap that had been stored under covered sheds were used. Consider the amount of ice and snow which will cling to scrap when exposed to the winter seasons with the impending danger of explosions resulting from its use and the fact that large steel mills working on a quantity production basis still consider it prudent to cover their stores of melting scrap. The feasibility of having covered sheds for steel scrap storage will be more fully realized.



Suggested Plan Which Represents an Ideal One for an Electric Tool Steel Plant

The life of the furnace refractories is shortened by an appreciable amount when the charge in the furnace consists of highly oxidized material, the increased volume of oxides making the ordinary scouring action on the lining and roof even more severe and hence the furnace is repaired more often. This, of course, means increased cost of repairs and consequent loss of time.

The position of standard and narrow gage tracks, as shown in the illustration, has been selected to permit the unloading of the incoming scrap and the loading of the charge for the furnace to be performed by the same crane and, if necessary, without even placing the scrap in storage. This last feature is sometimes advisable when it is desirable to mix heavy and light scrap for the charge without having the crane cover too much distance in doing so. It is convenient to have the track scales for weighing charges situated in the scrap shed so that cars or bogies, when on the scales, may be served by the crane and the exact weight desired can be furnished without having to make any "shifts."

Mold Storage

A portion of the shed which is used for steel scrap storage may also be used for the storing of new molds and sizes not in use. In the first place, the handling

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of them by the crane means that any desired number can be obtained on a short notice, whereas, if it is necessary to move them by laborers using skids and bars, the time required to get out the same number as by the crane would obviously be greatly increased. Also, the molds would be kept free from rust by being stored under a covered shed. When split molds are used, it is good practice to coat the inside surface with pitch or some other suitable protective coatings. The coatings are burned off when the molds are used for the first time and the molds have thus been preserved and the surface prevented from becoming pitted by rust.

Melting Platform

The illustration shows the arrangement of the furnace or furnaces, melter's office, bins and rest room which make for an efficient operation of the furnace. The question of rest room should not be overlooked, as there are times when the furnace men, and particularly the pit men and ladlemen, can rest for a while, and if a room is provided near their place of work it will be more attractive than to crawl off into some hiding place where they may be hard to find when needed. This, of course, applies generally to men working at night.

The installation of shower baths in the rest room affords a pleasure and comfort to the majority of men working in the melting department and their cost would be justified by the benefits derived through better health of the employees. One of the large steel mills in the Pittsburgh district installed four showers in one of their open-hearth departments, employing approximately 200 men, and they are used to capacity with a waiting line at every change of shifts. It is probably impossible to determine just how much good is derived from them, but it is safe to assume that better health is enjoyed by the men who use them regularly.

The melter's office should be built close to the furnace and should be so constructed as to permit of the accommodation of as few persons as necessary. An error made in the amount of additions to be made would, no doubt, mean a "lost heat."

The storage bins for fire brick, dolomite, loam, fluorspar, coke breeze, lime, nozzle and stopper brick and electrodes should be built so that a standard gage car could be unloaded directly into them. It is well to have them under the same roof as the furnace so that material can be transported from them to the furnace without great difficulty and without being exposed to inclement weather.

It will also be noted that materials such as fire and silica brick, electrodes and nozzle and stopper brick, that absorb frost readily, are stored where they are protected in some degree from exposure to the elements. Electrodes and electrode joints should receive special consideration along this line as excessive electrode breakage will result from using those which have become frosted. They should also be stored where no rain can beat in on them as moisture is almost as injurious as frost with regard to breakage.

Furnace Pit

The pit in front of the furnace should be so constructed that ample room is given for the receiving of a ladle larger than the rated furnace capacity. A heat is, at all times, liable to be lost in the pit and the larger the pit the more readily can any scrap be removed from it. The walls and bottom should be reinforced with concrete and a liberal radius should be allowed where the side intersects the bottom. This precaution is taken to add to the ease with which steel, which has entered the pit in a liquid state, can be removed after solidification. For this same reason it is good practice to cover the bottom of the pit with a layer of loam about 2 in. thick.

It is desirable, when possible, to have the melting platform, furnace with control panels, bins, etc., elevated about 10 ft. above the pouring platform, but the expense of such an arrangement is sometimes considered inadvisable. In case the melting and pouring platforms are on two separate levels, it is obviously unnecessary to have a pit, as the ladle for receiving the heat can rest upon its trunnions, supported by standards placed on both sides of the ladle for this purpose.

Ferroalloy Storage

The cost of ferroalloys and the ease with which some of them can be mistaken for each other makes it expedient that they be kept in bins in a general storage room made especially for them. This will also have a psychological effect upon men held responsible for getting the alloys to the furnace, as the more orderly the condition of the storage house the more care will be taken in keeping them in separate piles about the furnace.

The writer recently visited a steel mill using ferromanganese and ferrochromium and noticed a pile containing approximately 1½ tons of what looked at a distance to be either ferromanganese or ferrochromium. Upon making inquiry it developed that an inexperienced laborer had mixed 1100 lb. of ferromanganese with a pile of ferrochromium and the resultant mixture was of no use because of the fact that no heats were made at that plant using those amounts of manganese and chromium in combination.

This is an example of carelessness that is not uncommon around a steel mill and, although the amounts involved in this case are larger than are required in an electric furnace tool steel mill, it still remains a fact that setting the right example for some workmen in maintaining orderly looking storage houses has a decidedly lasting and desired effect upon the men taking materials from them.

The making of quality steels by the electric furnace process necessitates the running of preliminary analysis on such elements as carbon, manganese, chromium, etc., and the holding of the heat in the furnace until the results of the laboratory have been received. When the laboratory is near to the furnace, much time can be saved.

Ingot Storage

Ingot storage facilities should be arranged so that it is possible to bury ingots hot in a pit if desired or to store them cold in piles. Heat numbers should be stamped or marked legibly on each ingot and the ingots should be piled in such a way as to have their identity outward and easily obtained.

General Remarks

Tests which are being made from day to day to determine the physical properties of different grades of tool steels show that one company's steel may be of higher quality than another's, although they have, in all probability, bought their alloys according to the same specification, used the same grade of scrap, melted to the same chemical composition, and cogged their ingots at the same rate of reduction and at the same temperature. The difference is due to the fact that the first company has learned that quality must be injected at every stage of manufacture, while the second company, overlooking this fact, has only met the chemical requirements.

We are slowly realizing that hit or miss methods have no place in present day steel manufacture and also that the physical requirements of any tool steel are far more important than the chemical composition. It remains for some standard testing apparatus to be designed that will reveal the true requirements of tool steel and, until that time comes, our greatest safeguard against poor quality is by using steels that have been made by up-to-date manufacturers using up-to-date methods and equipments, and controlled by up-to-date supervision and design.

Clarksburg, W. Va., plant, Weirton Steel Co., Weirton, W. Va., which for several weeks has been operating at two-thirds of capacity, went on a full time and capacity basis Nov. 20.

Scottdale furnace, McKinney Steel Co., Scottdale, Pa., was blown in Nov. 17, after having been down since the latter part of 1920.

COUPLING BORING MACHINE

Bores Ends of Casing Coupling Simultaneously—Hopper Feed-Chuck and Loading Mechanism Automatic

A machine of the horizontal type, as shown in the accompanying illustration, designed for boring casing couplings, has been brought out by the Bullard Machine Tool Co., Bridgeport. The capacity is for work 6¼ to 12½ in., a change in chuck jaws and tool heads being required for each size.

The coupling is held stationary in a pneumatically operated universal two-jaw chuck located in the center of the bed. It is bored from both ends simultaneously, the tool heads on the boring spindles being designed to hold single-point tools for the taper bore as well as tools for the recess at each end. Tools for machining the coupling to length and turning the radius of chamfer on each end are also mounted in these heads. The spindles revolve in opposite directions and are mounted in heads at the ends of the bed, and driven from a common motor. The boring spindle heads are fed, as units, by barrel cams mounted on a common shaft within the bed.

Couplings are delivered to the chuck by a chute or hopper and, when finished, are ejected from the chuck into a receptacle provided. The chuck and the loading mechanism are operated automatically, and in conjunction with the feeding movement of the spindles by means of an adjustable timing mechanism mounted on the feed camshaft. The path of the taper boring tools is controlled by a form bar within each boring spindle, these bars being removable for changing. Tool heads may be quickly removed from the spindle ends. The tools, mounted in the tool heads, are ¾ in. square section and are independently adjustable and removable.

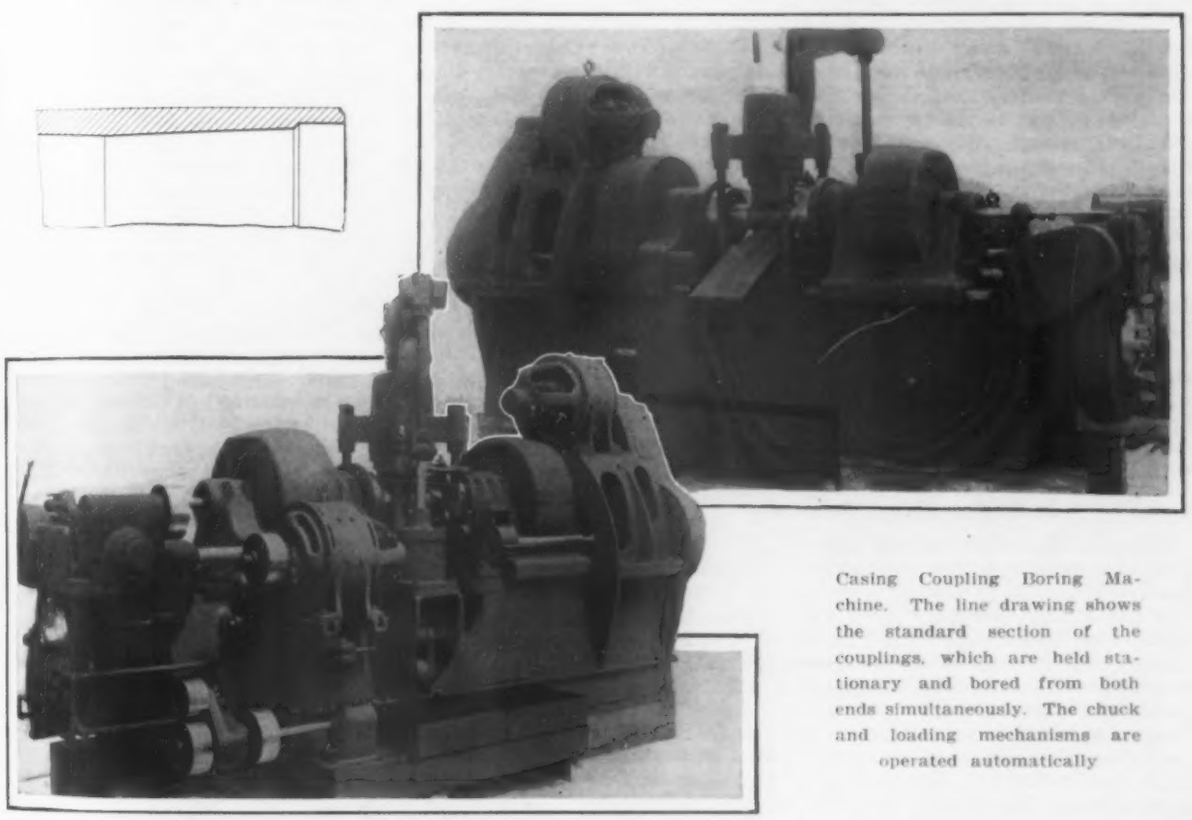
In operating the machine the taper form bars in the boring spindles are advanced to the operating position and the tool heads rapidly advanced to the point where the cut begins. The feed mechanism is engaged and the heads are advanced at predetermined rate of feed. One head, slightly in advance of the other, finishes its cut to the center of the coupling and then recedes to make room for the opposite head which feeds slightly beyond the center of the coupling, thus forming a finished junction of the two tapers at the center of the coupling. During the latter stages of the tapering cut, the recess in each end of the coupling is bored and the coupling is faced to length and chamfered or rounded on the outside diameter at each end. Upon completion of the cutting, the heads are rapidly returned to the initial position, the chuck is opened and the finished work ejected. All operations then automatically repeat.

The machine is driven by an adjustable-speed 10 to 25 hp. motor, mounted on top of the machine. A 5 hp. constant-speed motor at the opposite end is used for the circulating pump for the cutting lubricant, and for the rapid power traverse motion of the tool heads. Magnetic remote control for starting and stopping can be provided for the main driving motor. The connection between the main drive motor and driving shaft is by gearing.

The feed mechanism includes provision within certain limits, by means of change gears, for change of the rate of feed per revolution of the boring spindles. The forward movement of the boring heads is divided into two phases, the rapid advance to the point of cut where cut begins; and feed movement at predetermined rate. At the end of the cutting stroke the heads are returned rapidly to the initial position. The change from rapid advance to feed movement is by the location of a dog, adjustable for various coupling lengths.

Features of construction include alloy steel, heat-treated gears and feed cams of steel. Spindle and shaft bearings are bronze bushed and large ball bearing is provided for spindle thrust. Special attention has been given to lubrication. The tool heads form self-contained reservoirs, within which the driving gears revolve, carrying the oil to ducts that lead to the main spindle bearings. The feed cams are immersed in individual reservoirs. Special provision is made to prevent the entrance of cutting lubricant into the machine or its working parts. The cutting lubrication system includes a steel pan at the base into which the lubricant and chips are returned. A chip receptacle is provided.

The boring spindles are 8 in. in diameter and their speeds range from 10 to 40 r.p.m. The total movement of each tool head is 9½ in. Feeds may be selectively set within limits of 0.025 in. to 0.075 in. per revolution. Change gears are included for three rates of feed for each head. The weight of the machine, not including motor, is approximately 24,000 lb. and the actual projected floor space, in operation, is 12 by 5 ft.



Casing Coupling Boring Machine. The line drawing shows the standard section of the couplings, which are held stationary and bored from both ends simultaneously. The chuck and loading mechanisms are operated automatically

Judge Gary and Mr. Schwab Give Testimony

Defend Pittsburgh Base as Convenient Method of Quotation —Pools, Dinners and Previous Investigations Again Reviewed

BY L. W. MOFFETT

WASHINGTON, Nov. 18.—In the Federal Trade Commission hearing of the Pittsburgh base case, Chairman Charles M. Schwab of the Bethlehem Steel Corporation was on the stand a little more than one hour Friday morning, and was examined by Attorney Steinhauer of the commission. His testimony, however, was extremely general in character. Often, he was unable to recall details of matters brought to his attention and frequently was non-committal. As explained by Mr. Schwab himself, many of the details which related to practices in the steel trade when he was associated with the United States Steel Corporation as president, or in days previous to the organization of the Steel Corporation, when he was associated with Andrew Carnegie, had escaped his memory. As to detailed selling methods of the Bethlehem company, he said he was not familiar. The great majority of the questions put to him related to old pools, the manner of fixing steel rail prices, etc.

Mr. Schwab told Mr. Steinhauer that he had no definite occupation, that he is nominally chairman of the Bethlehem Steel Corporation, but practically a retired steel man. The description, however, striking the good-sized number of spectators as being humorous, really was intended to be serious, although stated by Mr. Schwab in his characteristically good-natured way. It did reveal the fact that he is not actively associated with the operating and selling conditions in the trade.

Pools Not Always Successful

Mr. Steinhauer asked Mr. Schwab if a buyer of steel at the Sparrows Point, Md., plant of the Bethlehem Steel Corporation would have to pay the Pittsburgh base price. Mr. Schwab replied that he assumed the price would be quoted on the Pittsburgh base, but explained that he has not been buying and selling for years and therefore could not make a definite reply. But he did take occasion to state as had been stated by Judge Gary and other witnesses that the Pittsburgh base does not mean price fixing but it is a convenient method of quotations. Mr. Steinhauer read from testimony given by Mr. Schwab in connection with the Government's dissolution suit against the United States Steel Corporation and attempted to refresh the memory of Mr. Schwab on details of his testimony, but Mr. Schwab said that he could not recall precisely what he had said so long ago. Asked by Mr. Steinhauer as to whether the pools of the old days were always successful, as price combinations, Mr. Schwab replied that they were not and said that the idea was to get fair prices but at the same time to prevent prices that were too low. He said that the pools did not prevent cutting of prices but that they endeavored to do so. He expressed the opinion, however, that the pools stabilized prices fairly well. He also humorously volunteered the remark that he had been the originator of most of the plate pools.

Judge Gary's Testimony

In many respects the testimony of Judge Gary when he reappeared on the stand last Wednesday was like that he had given the previous week. Attorney Steinhauer's questions were often mere repetitions of questions he had asked before and many of them also were either based on hypothetical conditions or assumed matters that are so fundamental that they really answered themselves. Judge Gary, however, maintaining good humor and patience, again testified frankly and fully. Attorney Steinhauer particularly questioned Judge Gary as to his statements regarding the law of supply and demand controlling the market and the fact that the Pittsburgh base plan is beneficial to consumers as well as to producers.

Judge Gary was asked about testimony that when operations were down to 25 to 30 per cent of capacity in sheets for the American Sheet & Tin Plate Co., Pittsburgh, how it was able to maintain the Pittsburgh base in accordance with the law of supply and demand.

Judge Gary said he was not familiar with the precise condition in the sheet industry, but said the Steel Corporation was trying to steady prices generally by preventing them from going to ruinous levels. He said that temporarily conditions might have gone contrary to the law of supply and demand but that it would be necessary for him to know the full circumstances before explaining the situation. He stated that some competitors had put prices down below the cost and cut wages. He said that he was free to admit that the Steel Corporation has tried at times to act in such a way as to disregard the law of supply and demand in order to keep prices on a fair and reasonable level.

"We do not believe," said Judge Gary, "in raising prices to an unconscionable basis or in selling at ruinous prices. In such cases sometimes the law of supply and demand is temporarily suspended. But sooner or later the law of supply and demand controls." He said that some corporations, like the Steel Corporation, will hold prices down notwithstanding the fact that they can get higher prices. It is a question of ethics, Judge Gary observed, but, he repeated, sooner or later the law of supply and demand will bring the market to its equilibrium because neither the seller nor buyer is smart enough to prevent it.

More Conscience in Business

"Besides," he added, "if I may say so, I think there is a growing conscience in business to-day."

Dwelling further on the ultimate control of prices by the law of supply and demand, Judge Gary cited an example to support his statement.

"If," he said, "a new business starts up in a locality and becomes successful and another plant is started up in another place, the first plant dominates the price situation. That covers all principal lines of business. As I have said before, I think Philadelphia was the first steel basing point, but Pittsburgh soon became the principal point for the manufacture of iron and steel and became the basing point." Other plants starting in other localities, it was pointed out, then based their quotations on Pittsburgh. A new plant, Judge Gary said, could not compete with Pittsburgh with its established plants and fine organizations. Chicago plants, he said, could not do it, when they were started, but were glad to develop in that district and by charging the Pittsburgh price plus the freight were able to live. In the course of time, it was stated, Chicago became more prosperous and users in that district naturally wanted to get steel as cheaply as they could. The consumers who caused the present complaint to be issued by the commission, Judge Gary said, claimed that steel could be made in the Chicago district as cheaply as in Pittsburgh. Improved plants at Gary, Ind., it was stated, brought about two things: First additional plants, like the Inland Steel Co., the Interstate Steel Co., and others, and, secondly, competition, which was exactly what Chicago needed and that, it was said, was where the Pittsburgh base came in. At times, it was declared, the base was almost entirely eliminated and Chicago basing was built up. Duluth, it was stated, came along and objected to the Pittsburgh base and wanted a steel plant of its own. Judge Gary said the

Steel Corporation established a plant there, and that it has not been very profitable, but it has been possible to supply part of the demand. Others, it was said, couldn't afford to go into Duluth.

New Plants Encouraged

The question of prices and bases, it was stated by Judge Gary, always depends on circumstances. The Pittsburgh base, it was explained, operates more especially as to localities, encourages new plants, and is a criterion for buyers who purchase raw and semi-finished steel and convert and sell it on that base. He said that there are involved in the whole question not only purchasers and sellers in particular lines but other lines that use basing points, a fact which he stated to the commission when the complaint was under contemplation.

It was declared that the kind of discrimination that those asking for the complaint wanted is the kind that favors them.

"Let them come into the steel business," added Judge Gary, "and they would immediately become a convert of the Pittsburgh base. You cannot change the natural course of trade for very long."

In replying to another question, Judge Gary said that he conceded as a witness that if there is any combination that is arbitrary and contrary to the Sherman law and causes prices to be fixed that are illegal and unconscionable, it ought not to be allowed to exist, but it was insisted that Pittsburgh basing is not the result of a combination. It was declared that it grew up naturally, was maintained naturally, and has largely disappeared because of the law of supply and demand.

"I do not believe," he said, "in large corporations taking unreasonable advantage of consumers and taking more than should be paid."

He recalled the fact that he maintained when the proceeding was commenced, he was in favor of an investigation but that it is a big and broad question affecting manufacturers, consumers and various territories of the United States and that consequently all interests and localities should have been made parties as interveners to the case.

"If we thought the law of supply and demand governed the situation," Attorney Steinhauer interjected when that question again was under discussion, "we certainly would recommend dismissal of the complaint."

When Attorney Steinhauer intimated that mills in the Chicago district were shut down in 1921 in order to sell steel from Pittsburgh and obtain the freight differential in supplying the Chicago demand, Judge Gary wanted to know of Mr. Steinhauer how long he thought it would be, if such a policy were adopted, before "we would starve to death." At another point Judge Gary told Mr. Steinhauer that if he knew as much about the purchaser as he does about the manufacturer Mr. Steinhauer would be "surprised at his (the purchaser's) cupidity." Judge Gary said, however, that the purchaser cannot be blamed; that it is human nature to get as much as possible, although he added that "conditions are cooling and we are getting on a new platform."

Examiner Bennett asked Judge Gary if cost does not govern prices. Judge Gary said that was true only in part.

"Don't you put too much of a soft pedal on cost?" inquired the examiner.

"It is a question of reasonableness of profits," replied Judge Gary. "Assuming that the profits of the Steel Corporation were limited to 4 per cent, that would drive the smaller producers out of business and create a monopoly." In this connection, Judge Gary took occasion to say that if it were possible to get the right kind of a Government commission, he, speaking for himself, would favor controlled maximum prices, but, he said, to get an intelligent, disinterested commission without prejudices is more than can be done at the present time.

"When will the Pittsburgh plus no longer obtain in Chicago under the law of supply and demand, as defined by you?" asked Mr. Steinhauer.

"When competition in Chicago is such that producers there will have to sell the same as Pittsburgh producers do," replied Judge Gary.

"When will the law of supply and demand in Chicago operate to bring about that condition?" inquired Mr. Steinhauer.

"That depends on profits, the course of business developments in the West and prices the buyers are willing to pay or at which producers are willing to sell." Judge Gary said that there is nothing to prevent manufacturers or middlemen in Chicago or anywhere else from going to Pittsburgh and getting advantage of the Pittsburgh base.

"I think that Chicago will be a base some time," Judge Gary remarked. "It is nearly that now in practice. But," he said, humorously, "I think it will be a long time before Duluth will be a base."

Replying to question by Mr. Steinhauer as to whether he meant the steel products on which the Chicago base would apply were plates, shapes, and bars, Judge Gary replied that it would be more particularly those commodities.

Pools and Dinners

Attorney Steinhauer attempted to go into a long drawn out history of pools in the steel industry, with which Judge Gary had nothing to do, but from which, he explained, he ordered the withdrawal of all Steel Corporation subsidiaries, when he became associated with the corporation, and learned of their participation in the pools. Mr. Steinhauer then attempted to take up the matter of the Gary dinners. Judge Gary said that since the beginning of the Stanley congressional hearings, the Steel Corporation had been careful to avoid all practices criticized by Government departments, much less the courts. Judge Gary said that the Gary dinners as a matter of fact amounted to only five in number and were held in 1907 and 1908, as a result of the panic of the former year. Judge Gary said that the dinners had accomplished their purpose. Their purpose, he said, was to urge the steel men to keep their heads and to prevent precipitate selling by customers of inventories. Incidentally Judge Gary took occasion to say that in the dissolution suit brought by the Government against the Steel Corporation, the judges of the Court of Appeals unanimously upheld the legality of the Gary dinners.

Taking another turn in his examination, Mr. Steinhauer attempted to show a discrimination in the prices quoted to railroads and fabricators. Apparently with this purpose in view Mr. Steinhauer asked Judge Gary about prices of steel rails. Judge Gary replied that for a great many years there was a price of $28, f.o.b. mill, which was established about 1898. Judge Gary said the price really was made by agreement between the late A. J. Cassatt for the railroads and himself. Judge Gary said he believed that the price of $28 had been maintained for a great many years because "we refused to sell at higher prices." But it was stated that higher prices were really justified.

Defends Privately Owned Railroad Cars

WASHINGTON, Nov. 21.—Defense of privately owned railroad cars was made during the hearing last Wednesday in the assigned car case before Commissioner Aitchison of the Interstate Commerce Commission by President C. H. Markham of the Illinois Central Railroad. The hearing, which relates to rules for distribution of coal cars, developed the fact that the carriers as a rule favored a continuance of the signed car rule, while the operators, generally speaking, were opposed to it. Mr. Markham testified in favor of a continuance of the rule on the ground that it was in favor of the public interest that railroads should be assured a steady and uniform supply of fuel, which he contended could be procured only by the use of the assigned car for railroad fuel.

In defending the privately owned freight cars, Mr. Markham pionted out that they relieve the railroads of the necessity of finding the capital to supply the equipment to serve the consumers who furnish the cars.

The United States Steel Corporation, he said, on cross examination, furnishes cars for its fuel and the Illinois Central hauls them in train loads, not because it desires to favor the Steel Corporation but because handling in train loads was the most economical way.

BOOK REVIEW

The Labor Injunction—An Exposition of Government by Judicial Conscience and Its Menace. By John P. Frey, editor of the *International Molders' Journal*, Cincinnati. Pages 197, 5¼ x 7¾ in.

John P. Frey has assembled in this book his objections to the use of injunctions in labor disputes, heretofore published in a series of articles in the "International Labor News Service." To these objections he has appended numerous declarations by the American Federation of Labor, condemning the use of the injunction in labor disputes, a copy of a model anti-injunction bill drafted and approved by the American Federation of Labor, and copies of a number of injunctions heretofore issued by the courts and some decisions by appellate courts vacating injunctions. Only one opinion sustaining an injunction is included. This would seem at first a trivial matter; but the text of the book itself confirms the suspicion that Mr. Frey prepared himself for his task by reading the opinions in cases in which injunctions were refused or vacated and then in reading the injunctions in cases where they issued, without reading the opinions which gave the reasons for their issuance.

Mr. Frey points out that American equity courts derived their original authority from the Anglo-Saxon system of jurisprudence, but that they have departed from the modern English authorities. The English courts are forbidden by legislation to issue injunctions in industrial disputes, and the author wholly overlooks the fact that our modern equity courts derive their authority from our constitutions and that they issue injunctions to protect rights guaranteed by those constitutions.

It is said that equity will exert its powers only to protect property rights. Mr. Frey stresses this point. He cries out, "Business is not property!" "Labor is not property!" But the right to do business and the right to labor are property. They are the only forms of property which, unhappily, many thousands of people have. Mr. Frey does not argue directly that the law should forsake the protection of these rights.

The author dwells upon the point that a storekeeper has no property right in his customers or an employer in his employees. He fails to discuss in any way the recognized right in the good will of a business and in the right to be unmolested in access to the markets for the sale of one's products and for the purchase of labor, and the right of those who have labor to sell in unmolested access to the opportunities of employment. Should the law fail to protect these rights? Mr. Frey does not say. Yet these are the rights the law seeks to protect by the issuance of injunction in industrial disputes.

Complaining that injunction decrees prohibit innocent acts which are protected by the constitution, the author calls attention to injunctions prohibiting unions from expending money for the relief of their members and prohibiting strikers from stating that a strike exists. It is an ancient rule of conspiracy that no act, however innocent in itself, is lawful when it becomes a step in an unlawful plot. This is the basis upon which acts otherwise lawful are prohibited. Mr. Frey does not pause to contest the merit of this doctrine.

Objection is made that the injunction is used to prohibit the commission of crimes, with a view to the destruction of the right of trial by jury. This, we think, is a misconception. Injunctions issue to prohibit unlawful acts for the protection of civil rights. The fact that the threatened acts may also be punishable as crime does not concern a court of equity.

Mr. Frey devotes a chapter to the contention that the law is not applied to employers and employees with even handed justice, but that what is held unlawful for employees to do is held lawful for employers to do. In view of the cases restraining combinations of employers from even discussing prices or exchanging information as to prices, from buying shares of stock in competing concerns and from breaching agreements with trade unions, and in view of the cases in the Supreme Court of the United States and elsewhere restraining boycotts by merchants, it is difficult to understand how Mr. Frey permitted himself to indulge in this libel upon the American judiciary.

He complains particularly that the courts have forbidden workmen to associate in a trade union while permitting employers to organize. His complaint is entirely without foundation. The opinions of some States have held that a strike to enforce a closed shop is unlawful because the benefit to employees from a closed shop is not justified by such an interference with the employer's business; but this does not mean that workmen who desire to join a union may not do so, and that if they do not care to work with men who are not members of a union they do not have to. By the same token, employers who do not care to employ union men may refuse to do so. So far, however, as the question of combination is concerned, the law is much more lenient with employees than with employers. Combinations of business men may be in themselves, at least so far as they may affect the price of commodities, unlawful conspiracies and they may be dissolved under the anti-monopoly statutes. But labor unions, in most States, are exempt from these statutes and there is no instance in which a combination of labor has ever been ordered dissolved.

In criticizing injunction orders on the ground that they are vague and beyond the understanding of the average striker, so that he abandons all his rights lest he infringe an order which he does not understand, Mr. Frey makes a criticism that in some instances must be true. His criticism of punishment for contempt without a jury trial is an old story. He states, inadvertently, that a judge may impose any punishment he wishes by way of fine or imprisonment. This is not the case certainly in a majority of the States, where punishment for contempt is limited by statute. The ancient law of equity courts regarding punishment for contempts has been upheld by the legislatures and the constitutions of our States and an examination of the records will show that the courts lean over backward in their care to avoid a judgment of contempt when there may be any shadow of doubt concerning the facts.

It is deeply to be regretted that Mr. Frey, since he has given so much time to the subject, did not give more time to it and did not answer the fundamental question at the bottom of this whole matter: viz., Shall the right to do business and the right to labor go unprotected, by the only adequate means for their protection, against assault by powerful combinations? But though he has overlooked this question, the matter of the reform of our courts of equity is one which he owns to be a question of law. Whatever correction may be needed, he justly leaves to the proper authority. He says: "The abuses which have emanated from American equity courts will eventually be corrected by law, and the trades union movement, because it is an American organization, loyal to American institutions and ideals, will continue to seek a remedy through legislation."

MURRAY T. QUIGG

New Books Received

Chemical Engineering Catalog, 1922. Pages 1187, 9 x 11½ in.; illustrated. Published by Chemical Catalog Co., Inc., 19 West Fortieth Street, New York.

Why Manufacturers Lose Money. By Robert Grimshaw. Pages 176, 5 x 7½ in. Published by D. Van Nostrand Co., 8 Warren Street, New York. Price, $2.

The Mineral Industry During 1921. Pages 903, 6 x 9 in.; illustrated. Published by McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York. Price, $10.

American Society for Testing Materials Tentative Standards, 1922. Pages 774, 6 x 9 in.; illustrated. Published by American Society for Testing Materials, 1315 Spruce Street, Philadelphia. Price, $7.

Steel, The Diary of a Furnace Worker. By Charles Rumford Walker. Pages 157, 5¼ x 8 in. Published by Atlantic Monthly Press, Boston. Price, $1.75.

Manchuria, Land of Opportunities. Pages 113, 6 x 9 in.; illustrated. Published by the South Manchuria Railway, New York.

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The Course of Steel Prices

Chairman Gary of the Steel Corporation said at the Federal Trade Commission hearing on Pittsburgh price basing that the corporation had not been making money in recent times. No one connected with the manufacture of steel since depression fell upon the industry in the fall of 1920 has been without reminders, many and unpleasant reminders, of the unprofitableness of the business. If, as Judge Gary estimated when testifying before the Lockwood Committee in New York last June, the Steel Corporation has $3 a ton advantage in costs over the large independent companies, it follows that when the Steel Corporation is not making money, its competitors are falling considerably short of making money. The statements of most of the independent companies which have been published in the past 18 months or more have been a disheartening iteration of deficits. One large company, whose statement for the first three quarters of the year came out recently, showed a deficit for the nine months of $3,348,000, and in the corresponding period of 1921 its deficit was $3,934,000. Red ink balances have been the rule. Dividends on common stocks, apart from the Steel Corporation, have been suspended, and even in cases where paper surpluses exist dividends on preferred stocks have been suspended because conditions demanded the conservation of all liquid resources.

As was pointed out repeatedly in 1921, when occasionally an ill-informed but assertive writer on phases of the readjustment in labor and commodities called for a heroic reduction of steel prices, the steel industry had stood a more complete deflation than any other save agriculture. While it was admitted that costs do not make market prices, the fact that many steel companies had gone below their costs was emphasized as a reason for expecting some producers to choose idleness rather than a continuance of operations which only piled up losses.

History repeated itself when late last February some mills, in the effort to create a backlog, took on business on a 1.30-cent to 1.35-cent basis for heavy products, these prices being the lowest reached since the slump of 1915, just before the war demand for American steel began to show itself. It is, in part, to the very considerable tonnages put on the books at these low prices last spring that the steel industry owes its large scale of operations in recent weeks, after the months of scarcity and premium prices due to the long-drawn-out coal strike.

Now that the question of steel prices is up again—that is, prices for the first quarter of 1923—it is not out of place to refer to what the industry has gone through in the past two years, for the light that thus may be thrown on the course of the market just ahead. It is still true that costs do not make market prices and that there is still a considerable variance in the costs of different producers of steel. But the one experience that is common to all producers—and the Steel Corporation has had no exemption—is that of a very definite and in some cases pronounced increase in costs since the weeks just before the coal strike, in which the market dipped to the lowest point since early 1915. Between the advances in labor and fuel that have come since the low-priced tonnages of February and March went on their books some companies have been literally ground between the upper and the nether millstones.

It will be said again, and it will be true, that supply and demand will be the arbiter in the present test of buyer and seller strength. On that basis reasons can be found for the prevalence, in the early months of 1923, of finished-steel prices not materially different from those prevailing today. The country has no stocks, and between labor scarcity and car scarcity the mills are not likely to increase the present rate of output. On the other hand, in spite of continued losses by some producers, and very narrow margins for the most favored, the advances in prices that have been agitated in some quarters may be still further delayed.

An interesting application of a rather unusual alloy steel has come to light. In an address before the New York chapter of the American Society for Steel Treating, last week, a representative of one of the largest American companies producing steel castings and forgings for locomotive parts stated that his company is rapidly expanding

its use of manganese-vanadium steel in forgings in place of plain carbon steel. The steel contains about 0.90 per cent manganese and 0.20 per cent vanadium. It has excellent physical properties, is superior to the plain carbon steel lower in manganese that was formerly used, and is especially responsive to the heat treatment necessary for the parts into which it goes. A similar steel, higher in manganese but without the vanadium, made a record during the war because of its unusual properties. Containing 1.25 to 1.50 per cent manganese, it must be regarded as an alloy steel. It is still in use, but its possibilities are not yet fully appreciated, though investigations of its behavior are actively in progress. With part of the manganese replaced by vanadium, this new alloy steel is an illustration of the many combinations possible and of the tendency of simple alloy steels to replace plain carbon steels.

Making Common Labor Jobs Fewer

It is often remarked that the so-called "labor leaders," the officials of unions of skilled workmen, are unintelligent when they oppose immigration. The argument is that most work involves the employment of both skilled and unskilled men, and a good supply of "common" labor is likely to encourage industrial undertakings, and thus more work will be provided for the skilled men.

It is not well to underrate the capacity of an opponent, whether in debate or other activity. If, from their side of the case, the labor leaders had been making a mistake, their attention has been called to the mistake so repeatedly that it is reasonable to suppose that they would have changed their view by this time. It is better to recognize the fact that in a number of cases they have support, in actual developments, for their attitude. There is, for instance, the fact that not so many years ago hod carriers were essentially drawn from the ranks of common labor. To-day in most communities the hod carriers are organized. They have a union, a scale and the familiar restrictions as to what they will not do. Again, the employment of helpers to machinists, boiler makers and many other craftsmen is the regular thing, when formerly such help as might be requisite was furnished by common labor. Possibly there is not much boasting about these achievements, but the facts may as well be recognized.

Those who desire better conditions should work for improvement rather than indulge in academic presentations. One essential thing is for the majority to organize to combat the organized minorities that oppose immigration. Majorities count only when they are organized.

Another thing to do is to face the condition and make up for scarcity of common labor by the introduction of labor saving devices. To such improvement there is no end. There is never a time when a builder or manufacturer can feel that he has done all that can be done, has made all the progress there is to be made in this direction.

The preference of men for "easy jobs" is no transient phenomenon. It is a natural preference and as a matter of plain fact its exercise has been greatly facilitated by the progress of the mechanical arts. It requires much less skill than formerly to be a regular carpenter. The most difficult work is done by machinery and the architect supplies much more information than he once did. Corresponding changes have occurred in most of the crafts. The difference between the common labor job and the skilled labor job has become much less in point of skill and at the same time has become greater in point of muscular effort required. The condition is not really inconceivable of its costing more money to induce a man to navigate a wheelbarrow than to handle hatchet or saw, to carry pig iron than to watch a lathe. All of which suggests that more attention needs to be paid to improvements that look toward reduction in the use of so-called "common labor."

Hourly Output a Constant

When the movement toward shorter hours in industrial plants was taking form many persons held that a reduced time schedule would result in increased production per hour. Under such circumstances, it was argued, men would accomplish as much, say, in nine hours as they had in ten, excepting as the factor of machinery entered into the calculation. Experience in the United States has demonstrated no such result among workers who are paid by the hour. With the piece worker the desire for personal profit caused some gain, but not by any means what was predicted.

Years ago, in the very beginning of the reduction in working hours, when men had been laboring from "sun-up to sunset," the shorter day did materially increase efficiency. The period of daily physical effort was so long that men lagged in the later hours of the day. Therefore, when ten hours had become the standard working day, theorists, not recognizing the real reason of the former improvement, argued that a still higher efficiency per hour would follow further decrease in schedules. In most cases they were mistaken. Production per hour remained a constant.

A British committee has been making a survey in connection with a decrease from a 54-hour to a 47-hour week. It has found that in Great Britain the drop in output has been directly in proportion to the time, a result directly opposed to the theory of many economists over there. They have been disappointed exactly as American economists were disappointed with the reduction of hours in American mills and factories. The findings caused some concern in considering competition from other countries, and investigators of the committee began to delve into the experiences of competing nations of the Continent. The *Engineer*, in analyzing the situation in Europe as a whole, deduces as a law, "The average output per hour per worker is a constant," the truth of which was long ago recognized in this country.

The Belgian Minister of Labor is quoted as stating that the evidence in his possession showed a greater decrease in output in the case of the time workers than in the case of the piece workers, but in all cases output per hour had diminished. In Belgium working hours had been cut from 55 or 60 to 48. Apparently, from the minister's statement, the per cent of reduced produc-

tion was greater than the per cent of reduction in hours.

The Dutch Permanent Secretary of Labor reported as a special case that "when the hours in textile works were reduced from 11 to 10 the result was an increase in output per hour, but the further reduction from 10 to 8 hours had not had the same result." In Germany the British committee found output had been reduced in proportion to the reduction in hours from 54 to 48.

"Thus," says the *Engineer*, "the theory of those who held that because men work fewer hours they would get less tired and stale and therefore would produce as much as they did in longer hours, is exploded with its fellow theory that the efficiency before breakfast was very low. Probably each nation has for itself a nearly fixed rate of output per hour."

Fluctuations in Steel Production

One method of making apparent the wide fluctuations there have been of late in steel production is to compare the successive six-months periods April to September and October to March respectively. The periods are not dissimilar in length, one having 183 days and the other 182. Comparison can be made by taking the monthly ingot production of the thirty companies which make monthly returns to the American Iron and Steel Institute. Such a comparison does not bring out the extreme of the fluctuation, since the thirty companies made 84.2 per cent of the industry's total in 1920 and 87.5 per cent in 1921. That is, the companies not reporting monthly had a wider fluctuation than those reporting, since 1921 was a year of lighter production than 1920.

The institute totals are given below, and for convenience in comparison each total is given an index number or relative, the base or 100 being the average half-yearly output in the two years, 1920 and 1921. The base may be considered representative of average consumption in the two years, it being reasonable to assume that after the iron and steel strike and coal strike of late 1919 stocks of steel were low, while after the drastic liquidation of 1921 stocks were also low.

Steel Ingot Production by 30 Companies

Six months ended:	Gross Tons	Relative
September, 1920	17,304,960	135
March, 1921	13,518,658	105
September, 1921	6,599,401	51
March, 1922	10,413,159	81
September, 1922	14,865,596	116

These are certainly wide variations. The general industrial activity of the country did not show such swings. The term "consumption" will be defined according to the individual viewpoint. The steel producer is apt to define it as including distribution by jobbers, placement in construction work and fabrication by sheet metal shops, machine shops, agricultural implement works, tool makers, etc. The steel has been consumed if it no longer lies in the hands of the steel mill's customer in the form in which it was shipped. If, however, there are unusual stocks of implements, tools, hardware, machinery, etc., in the hands of manufacturers or distributers the steel is not really consumed. It is not yet performing the function for which it was destined. Early in 1921 there were large stocks of such manufactures of steel.

As a general policy it is no doubt desirable that stocks of commodities should be carried somewhere, to absorb to an extent variations in consumption and unavoidable variations in production. In steel, however, there have been not a few indications that stocks accumulate when consumption is heavy and are drawn upon when consumption is light. To deny that any such practice has obtained would be to say that the actual ultimate consumption of steel has had wider variations than the fluctuations in production shown above. That is improbable, to say the least. Reference is made, of course, to the putting of steel into use, not to the activity of shops that manufacture steel wares for employment.

For the rate of production in October of this year the relative would be 134, almost equal to the highest relative in the table given above, that for the six months, April to September inclusive, 1920. Steel production in November has been substantially at the October rate. Accordingly, the rate of steel ingot production since Oct. 1 has been 15 per cent greater than the rate in the six months preceding Oct. 1. That is a fact that is worthy of careful consideration.

Opposed to Ore Carrying Railroads Consolidating

WASHINGTON, Nov. 21—Opposition of consolidation of the Duluth, Missabe & Northern and the Duluth & Iron Range railroads, owned by the United States Steel Corporation, with the Great Northern was expressed before the Interstate Commerce Commission in connection with its hearing regarding consolidation of carriers into certain units. The opposition relating to the Steel Corporation carriers was made through W. A. McGonagle, vice-president of the Duluth, Missabe & Northern, and F. E. House, president of the Duluth & Iron Range.

It was declared that these two carriers are used purely for carrying iron ore, they compete with the Great Northern, that the consolidation would not increase the strength of the latter and that it would reduce competition.

Youngstown Sheet & Tube Co. Records

YOUNGSTOWN, Nov. 21.—Operating an average of 11.2 open-hearth furnaces in October, out of 12, the Youngstown Sheet & Tube Co. established a new monthly steel production record, turning out 75,008 tons. During the last half of the month production was at the rate of 85,000 tons monthly.

The blast furnace department also set a new record for this company for four stacks in producing 73,000 tons of iron. Several tube mills also broke records.

Contracts for heating furnaces are reported by F. J. Ryan & Co., Wesley Building, Philadelphia, as follows: Davis Brothers, Philadelphia, six bolt stock furnaces (oil fired), a special oil fired furnace and two oil fired rod heating furnaces; Gleason Works, Rochester, N. Y., automatic two stage control high speed tool treating furnace; U. S. Cast Iron Pipe & Foundry Co., Birmingham, duplicate annealing unit for centrifugal pipe casting machine; American Steel Foundries, Chester, Pa., oil burning equipment for 45-ft. pit annealer; Perfection Spring Co., Cleveland, rebuilding of oil fired spring treating furnace; Pusey & Jones Co., Wilmington, Del., oil burning equipment for 50-ft. angle furnace; Milton Mfg. Co., Milton, Pa., 30-ft. automatic rod heating furnace, and Mathieson Alkali Works, Saltville, Pa., high speed tool treating furnace.

PIECE WORK PLAN

Highly Satisfactory Results Obtained in Plant of Packard Motor Car Co.

DETROIT, Nov. 20.—J. H. Marks, industrial engineer of the Packard Motor Car Co., discussed "An Outline of Group Labor Incentive and Its Application to a Foundry" before the meeting of the Detroit Foundrymen's Association held Nov. 16 at the headquarters of the Employers' Association. Starting with the observation that, in 75 to 80 per cent of the years, industrial conditions necessitate some form of wage incentive beyond the workmen's mere desire for employment, the speaker outlined and sketched the merits and shortcomings of the piece work plan, the payment of premiums for excess and similar methods of stimulating efficiency.

The plan followed in various departments of the Packard factory for several months has shown remarkable results, in that the number of employees has dropped from above 6000 to 4000 or less with a steady increase in production. It is based on the proportion of efficiency actually achieved to a pre-determined standard. If this standard is set at 80 per cent, as is the case in certain departments, a bonus of 1 per cent is paid all productive labor in that department, this including the foreman, for each per cent of increased efficiency. The gain to the company comes through reduction in overhead and through steadier, better regulated production. In each department a bonus board each day tabulates the excess percentage of the previous day as well as the average of the pay-period to date.

In setting the standard of efficiency, a study of "lost time" was found of vital importance and, the speaker said, would reveal some surprising conditions in any manufacturing plant. The adoption of this plan has resulted in a steady decrease in the total time-hours, with an increase in production and a reduction in the cost of castings. As only the good castings acceptable to the next department are counted, this method of course eliminates payment for bad castings.

It has reduced the labor turn-over to a marked degree; the shirker is influenced by his associates either to speed up or quit, and workmen of ability are brought in by the older employees wherever vacancies occur. The Packard factories employ only American citizens. In the foundries, the men work in four groups—aluminum, brass, core-room and gray-iron, in the last of which well over 100 men are employed.

British Iron and Steel Market

Standard Oil Buys 150,000 Boxes Tin Plate in Wales—Expect 20,000 Tons Rails to Go to Continent

(By Cable)

LONDON, ENGLAND, Nov. 21.

Pig iron is steady. Home demand is expanding but export buying of foundry iron is generally poor. America is still purchasing special grades of Cleveland foundry iron. Hematite is firm. Some works are full for the remainder of the year. There is renewed American demand and fair parcels have been sold, while inquiries continue for regular monthly shipments through the whole of next year. Home demand is fair.

Foreign ore is easier. Bilbao Rubio is held at 21¾s. to 22s. ($4.87 to $4.93), ex-ship Tees.

Steel position is generally unaltered.

Continental markets are affected by exchange fluctuations, but good business is being done in rails for the Far East. The South Manchurian Railroad is inquiring for 20,000 tons of rails and it is expected that the order will go to the Continent. Continental pig iron is dearer on advanced franc quotations.

Semi-finished steel (Continental) is weak. Belgian billets have been sold at £4 17½s. ($21.84) f.o.b., December shipment.

Tin plate is firm. Some works are asking up to 20s. ($4.48), basis, f.o.b. January and onward, but second-hand sellers place it at 19½s. ($4.37), basis, f.o.b. Canada is inquiring for large quantities, and part has been placed, at 19½s. basis, f.o.b., for spring shipment. The Standard Oil Co. has placed 150,000 boxes in Wales; the final destination is uncertain.

Galvanized sheets are quieter. The works are booked up to January. For delivery further forward, prices could be shaded.

Japan is still buying moderate quantities of black sheets. Other markets are quiet.

We quote per gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at $4.48 per £1, as follows:

Durham coke, delivered	£1	9s.	to £1	10s.	$6.50 to $6.72
Cleveland No. 1 foundry	4	17½			21.84
Cleveland No. 3 foundry	4	12½			20.72
Cleveland No. 4 foundry	4	10			20.16
Cleveland No. 4 forge	4	5			19.04
Cleveland basic	4	0			17.92
East Coast mixed	4	13½			20.95
Ferromanganese	£15	0s.			$67.20
Ferromanganese*	14	10	to £14	15s	$64.96 to $66.08
Rails, 60 lb. and up	7	5	to 8	0	32.48 to 35.84
Billets	6	15	to 7	0	30.24 to 31.36
Sheet and tin plate bars, Welsh	7	0	to 7	7½	31.36 to 33.04
Tin plates, base box	0	19½	to 0	19¾	4.37 to 4.42
					C. per Lb.
Ship plates	8	10	to 9	0	1.70 to 1.80
Boiler plates	11	10	to 12	0	2.30 to 2.40
Tees	9	0	to 9	10	1.80 to 1.90
Channels	8	5	to 8	15	1.65 to 1.75
Beams	8	5	to 8	15	1.65 to 1.75
Round bars, ¾ to 3 in.	9	0	to 9	10	1.80 to 1.90
Galvanized sheets, 24 g.	17	5	to 17	10	3.45 to 3.50
Black sheets, 24 gage	11	15			2.35
Black sheets, Japanese specifications	15	5			3.05
Steel hoops	11	0	& 11	10*	2.20 & 2.30*
Cold rolled steel strip, 20 g.	23	2½			4.63
Cotton ties, Indian specifications	15	0			3.00

*Export price.

Continental Prices, All F. O. B. Channel Ports, Delivery as Specified

No. 2 foundry pig iron:					
Belgium, Jan.	£4	2½s.			$18.48
Luxemburg, Jan.	4	2½			18.48
France, Jan.	4	2½			18.48
Billets:					
France, Jan.	4	17½	to £5	0s.	20.84 to $22.40
Luxemburg, Jan.	4	17½	to 5	0	20.84 to 22.40
Lorraine, Jan.	4	17½	to 5	0	20.84 to 22.40
Wire nails (keg basis):					
Germany	0	14½			3.25
Belgium	0	20½			4.59
Wire rods, 5 mm. (0.2 in.):					
Belgium	7	5	to 10	7½	32.48 to 46.48
Angles:					C. per Lb.
Belgium, Sept.	7	7½			1.48
Tees:					
Belgium	8	5			1.65
Merchant bars:					
Belgium, Feb., Mar.	6	10	to 6	12½	1.30 to 1.33
Luxemb'g, Jan., Feb.	6	10	to 7	0	1.30 to 1.40
France, Jan.	7	0	to 7	2½	1.40 to 1.43
Germany, Dec., Jan.	6	0	to 6	5	1.20 to 1.25
Joists (beams):					
France, Jan.	6	0	to 6	2½	1.20 to 1.23
Belgium, Jan.	5	15	to 6	0	1.15 to 1.20
Luxemburg, Jan.	5	10	to 5	15	1.10 to 1.15
Channels:					
Belgium	7	10	to 7	12½	1.50 to 1.53
⅜-in. plates:					
Germany, Dec., Jan.	6	10			1.30
Belgium, Jan.	6	10			1.30
Luxemburg, Jan.	6	10			1.30
France, Jan.	6	10			1.30
No. 8 gage wire:					
Belgium	14	10⅝			2.91

A competitive examination for architectural draftsman is announced by the United States Civil Service Commission and for further information application should be made to the commission at Washington, asking for form 1312. A vacancy at the public works department of the Naval station at Guam is to be filled from this examination.

INVESTIGATE THE UNIONS

Demand Emphasized by President Barr at Meeting of National Founders' Association

At the opening session of the annual meeting on Wednesday at the Hotel Astor, New York, of the National Founders' Association, President William H. Barr devoted himself at some length to the propriety of Congress's determining "what value, if any, the trade unions are to the public." In calling for an unbiased investigation, he asked:

What value are they to the members; who are the chief beneficiaries of unionism, and show by comparison the average financial standing of the union worker in a given district as compared with the free American plan worker.

Why are all union controlled commodities more expensive, and to what extent has restriction of output contributed to the increased cost of living?

Congress might also determine what rules of efficiency, if any, govern membership in the trade union.

Why is the training of apprentices limited, and the resulting trade education of our American boys stifled?

How are strike votes taken, and what is the average percentage of the membership voting? Who counts the votes, and where?

What is the total income of the international unions in America for the last year? How is it spent? What percentage goes for salaries of officers and agitators, and what percentage actually returns in the form of benefits to the members?

Why is one man permitted to determine why 50 or 100,000 mechanics willing to work under fair conditions may not do so?

Why are the public utility unions directed by a few men permitted with startling regularity to secure a strangle hold on the prosperity and comfort of our people?

Why is the incorporation of unions and correlative financial responsibility not made compulsory?

Why is it that when the railroad brotherhoods elected that the word "violence" be included in a given contract, that "assault and battery" is not regarded by them as a form of violence? Why is it that the murder of 60 men by union members and sympathizers in the State of Illinois evokes no voice of protest, and no question as to why the murders were committed? Why should the unions not clearly define their opposition to every form of public police protection? Why are union members required under oath to place their union sympathies above their obligations as citizens?

Use of Union Money

How many of our citizens understand that the total union income per annum is approximately $100,000,000? How many know that in 1921 the bituminous miners alone collected $17,000,000 in dues, most of it provided for them by the operators through the check-off system? Has that big $100,000,000 fund been used to promote the prosperity of the union or any other workers? to restore the industrial normality of the country? to stimulate the betterment of working conditions? or has it been used to promote the personal interests and advancement of union leaders and their associates?

The failure of unionism is not so much in its forgotten principles, but in its practice; not wholly in its inspiration, but in its leadership; not altogether in the protective policy it enunciates, but in the destructive policy it follows. There should be only expressions of sympathy for the men who have sold themselves into unionism for the benefit of that protection which is so completely lacking. We commisserate with those members who permit subordination of all that is fine in human instincts to the will of men who are not fit to lead.

If confirmation of this statement is needed, note well the attacks on the Supreme Court of the United States; the attempts to change and limit its power by constitutional amendment; the effort to control Congress and the State legislatures; the imposition of certain restrictive legislation on all except the unions, and the partial success of the unions in absolving themselves from certain laws.

Duty of Employers

President Barr discussed the questions of immigration and labor shortage, the duty of employers, the meaning of the open shop and the relation of good citizenship and politics. "The modern employer," he said, "who takes the point of view that his workers are chattels is not entitled to inclusion in the association of intelligent employers; nor has he a place in any community of good citizenship. It is true that, today, there are few unintelligent employers who seek to exploit their workers; but these should be eliminated, and thereby would be destroyed the antagonism which still exists, to some degree, in the public mind against employers generally.

"There can be no set rule for prescribing the duties of an employer, but, above all, he must recognize that the treatment of employees should inspire that desire for individual accomplishment, that pride in the job, which the labor unions have almost completely destroyed.

"There is no definite solution of the labor problem, for human desire will always reach out for changed, if not always improved, conditions, as it is the natural desire of every man to make his path through life, and that of his family, apparently easier.

"Therefore, we should so regulate our conduct toward our workers that we will furnish an object lesson in common honesty and in good citizenship. The man who treats his workers properly will receive a fair day's work for a fair day's pay; he will be better understood as their friend, and will at once make a sharp contrast with the union labor agitator who never is a real friend of any but himself."

COST OF LIVING HIGHER

All Items But Fuel Higher Than in September

Wholesale prices in October averaged nearly 1 per cent higher than in September, according to the information gathered by the Bureau of Labor Statistics, and 8.5 per cent higher than in October of last year. Similarly, the average retail price of food is reported 2 per cent higher in October than in September, but it is 6 per cent lower than it was a year ago. And the National Industrial Conference Board reports the cost of living, based on the wage earner's budget, as 1 per cent higher in October than in September, but 4 per cent lower than in October, 1921.

Metals and metal products, as a group, advanced ¼ per cent during the month, and reached a point 16.4 per cent higher than a year ago—this, in spite of recent recessions in pig iron. But THE IRON AGE composite price for pig iron, at mid-October, was 51 per cent higher than a year ago, and the composite for finished steel was 11 per cent higher than in 1921.

Metals stand liquidated 66 per cent of the 1920 peak price excess over 1913—that is, 66 per cent of that excess has been wiped out. This liquidation, a year ago, had reached 84.5 per cent, a portion of which has since been lost by price advances in nearly all items. All commodities have been liquidated 65 per cent, on the basis of the October figures; a year ago, it was 71.5 per cent.

Index Numbers of Wholesale Prices, by Groups of Commodities

(1913 equals 100)

	1920 Peak	1921 Oct.	1922 Sept.	1922 Oct.	Advance in One Year, Per Cent
Farm products	247	124	133	138	11.3
Food, etc.	248	140	138	140	0
Cloths and clothing	346	180	183	188	4.4
Fuels and lighting	281	189	244	226	19.6
Metals and metal products	203	116	134	135	16.4
Building materials	300	159	180	183	15.1
Chemicals and drugs	213	131	124	124	—5.3
House-furnishing goods	275	180	173	176	—2.2
Miscellaneous	208	118	116	120	1.7
All commodities	247	142	153	154	8.5

President James A. Farrell of the United States Steel Corporation, it has been announced at Georgetown University, Washington, will direct the financial affairs of the Georgetown Endowment Association in its nation-wide campaign to raise a $5,000,000 building and extension fund.

Fire at the plant of the Fairbanks Piano Plate Co., Springfield, Ohio, Nov. 13, damaged a part of the plant to the extent of $45,000.

PITTSBURGH BASE HEARING

Taking of Direct Testimony Ended—Steel Corporation Will Now Have Its Turn

WASHINGTON, Nov. 22.—Begun in Milwaukee on Jan. 30 of the present year, the taking of direct testimony by the Federal Trade Commission in the Pittsburgh base hearing was concluded here this morning with the testimony of President Alva C. Dinkey of the Midvale Steel & Ordnance Co. Examiner John W. Bennett, who is presiding at the hearings, has arranged tentatively with counsel for the United States Steel Corporation, the respondent, to resume hearings in Chicago on Jan. 22, for the taking of direct testimony for the Steel Corporation. There is no possible way of indicating when the case will be finally disposed of by the commission before which it has been in one form or another since 1919. It is conceivable that the personnel of the commission will have changed considerably before the conclusion of the case is reached.

The principal witness called and examined by the commission since it started its hearings in Washington on Nov. 1 was Chairman Elbert H. Gary of the Steel Corporation. His testimony occupied one day week before last and a day and one-half last week, when it consumed all of Wednesday and the morning of Thursday.

Mr. Dinkey's Testimony

Mr. Dinkey was asked by Attorney Burr for the commission as to the manner of the Carnegie Steel Co., of which Mr. Dinkey was formerly president, in quoting prices on steel as far back as 1904.

Mr. Dinkey replied that it was so long ago that he does not remember. He was then asked what his attitude toward the Pittsburgh plus plan is if it is used by all steel companies to stipulate given prices and then to which is added a charge based on the freight from Pittsburgh to destination.

"If such a practice were in vogue to quote on shipments all over the United States, then, of course, I would like to see it done away with," replied Mr. Dinkey, "but I do not think it is in vogue."

Invoices showing shipments of steel by the Cambria Steel Co., Johnstown, Pa., were brought along by Mr. Dinkey at the request of the commission and submitted in the records. They showed that shipments are based on variable practices, governed by market conditions, sometimes carrying delivered quotations, which on occasions worked back to the Pittsburgh base quotation while on other occasions they did not. The witness said all works of the Midvale company followed the same policy.

A Matter of Conjecture

Asked as to whether he thought the Pittsburgh base method of quoting stabilized prices, Mr. Dinkey described the reason for the Pittsburgh base as conjecture. By that, he said, he meant that no one knows the precise reason because the practice has come about through evolution and that it is not possible to know the reason for something that "just grew."

"Anything that keeps on base as against many bases," continued Mr. Dinkey, "I think tends to stabilize prices. But my thinking it does not make it so. Another system of prices might be much more stable."

President MacMurray's Testimony

The hearing on Monday was confined to testimony given in the afternoon by James E. MacMurray, president of the Acme Steel Goods Co., Chicago, maker of cold-rolled strip steel and buyer of steel billets, and H. E. White, statistician of the commission, who put in additional figures on freight rates and contracts for steel of various kinds. Mr. MacMurray told Attorney K. E. Steinhauer for the commission that he sold a large proportion of his product in the East and also a great deal in Europe and the Straits Settlements. He named various steel concerns from which he purchased billets, among those being the Donner Steel Co., Buffalo, and the Illinois Steel Co., Gary, Ind.

"How do the Donner steel prices compare with those contemporaneously quoted by Pittsburgh manufacturers?" asked Mr. Steinhauer. "Sometimes they are the same, sometimes they are higher, and sometimes they are less," replied Mr. MacMurray.

"How do the prices of the Illinois Steel Co. compare with prices contemporaneously quoted by Pittsburgh manufacturers?" asked Mr. Steinhauer.

"Most of the time they are the same as the reported Pittsburgh prices," Mr. MacMurray responded.

"Were they at any time lower?" inquired Mr. Steinhauer.

"Oh, yes," replied Mr. MacMurray.

The witness said that he thought the Illinois Steel Co. prices were a little higher, probably $1 per ton, than the quoted Pittsburgh prices, the first of the present year. Ordinarily, he said, his company bought billets at a certain price at the mill of the Illinois Steel Co. and not at the Pittsburgh price plus freight. He also submitted in evidence orders for steel plates with the Donner Steel Co. where the latter absorbed freight.

(Further details of the hearing in Washington will be found on page 1366.)

SHELL STEEL SOLD

About 19,000 Tons Sold at Auction by Government Salvage Board

At a recent public auction of steel shells, brass cartridge cases, shell forgings, hand grenades and similar scrap, held by the Philadelphia District Salvage Board in its New York office, Room 808 Army Building, 39 Whitehall Street, New York, about 13,950 gross tons of steel shells with copper turning bands, lead disks and brass base covers; about 482 gross tons of Stokes' motor shells; about 1830 gross tons of shell forgings; about 480 tons of brass cartridge cases; about 860 gross tons of hand grenades, and about 1516 gross tons of trench mortar shells were sold.

David Kaufman, Elizabeth, N. J., was high bidder on about 4176 gross tons, about 332 gross tons, about 390 gross tons and about 912 gross tons of steel shells in lots, all at the reserve depot, Hammonton, N. J. David Kaufman also was high bidder on about 336 tons of steel shells at the reserve depot, New Cumberland, Pa., and 749 tons of steel shells at Middletown, Pa., as well as 3177 gross tons of British shells at Raritan Arsenal, Metuchen, N. J., and 276 gross tons at the Woodbury depot, Westville, N. J.

The Manhattan Machinery Co., New York, was high bidder on 344 gross tons of steel shells at the ordnance depot, Hammonton, N. J., 139 gross tons, one ton and 10 tons of steel shells, and 23 tons of hand grenades, all at the ordnance reserve depot, Charleston, S. C.

The New Haven Iron & Metal Co., New Haven, Conn., bid in 1248 gross tons of steel shells and about 159 gross tons hand grenades both at Hammonton, N. J., and about 300 gross tons of hand grenades at Penniman depot, Penniman, Va., about 60 gross tons of steel shells at Delaware depot, Pedricktown, N. J., and about 60 gross tons steel shells at Raritan Arsenal, Metuchen, N. J.

Hyman-Michaels Co., Pittsburgh, bid high on about 541 gross tons of steel shells at the reserve depot, Penniman, Va., and about 1312 gross tons of howitzer shells at Penniman, Va., and about 357 gross tons of shell forgings and about 1518 gross tons of steel howitzer shells at general reserve depot, Schenectady, N. Y. Also this company was high bidder on about 1473 gross tons of shell forgings and about 399 gross tons of steel shells both at Pedricktown, N. J.

Hurwitz Brothers, Syracuse, N. Y., were high bidders on about 23 gross tons of steel shells at the general reserve depot, Schenectady, N. Y.

H. Jaffe, New York, was high bidder on about 596 gross tons of steel shells at the reserve depot, Seven Pines, Va., and about 207 gross tons of steel shells at New Cumberland, Pa. H. Jaffe also bid in about 263 gross tons of brass cartridge cases at Schenectady, N. Y., about one gross ton at Curtis Bay, Baltimore, Md., and about 183 gross tons at Middletown, Pa.

JAPAN STILL BUYS RAILS

Inquiry from Corea Calls for 6000 Tons—Sheet Business Goes to Europe—Aluminum Imports Slack

NEW YORK, Nov. 21.—The export market is generally dull, although there is some business appearing in small orders from South American markets and a few inquiries are being handled from the Philippine Islands. The Chinese market shows no prospect of immediate change for the better. Merchant buying from Japan is still practically at a standstill, although there have been some inquiries and the sale is reported by one Japanese import and export house in New York of a tonnage of medium weight black sheets. Although there are heavy stocks of black sheets still being held in stock in Japan, they are largely of No. 30 gage and lighter. Numerous orders for black sheets of light and medium gage are evidently still being placed in the United Kingdom and in European markets. While sheets of this origin are admittedly not of the exact standard desired by the Japanese buyers, a tendency to improve the product is reported as evident among British sheet mills. That there is still a fair tonnage of black sheets being purchased by Japanese importers in Europe is evidenced by the recent report that two of the largest Japanese export companies have within the past few weeks placed orders in London for between 6000 and 8000 tons of black sheets, close annealed. There is some interest from Japan in purchases of structural steel, but most of the inquiries which appear are of Governmental origin. One large Japanese export house in New York has recently booked an order for 170 tons of beams and channels.

The recent tender of the imperial Government Railways for 5000 tons of 60-lb. rails and 250 tons of splice bars, upon which it was stated bids on furnishing German material would be acceptable, has been awarded to a German mill at a price said to have been about $8 per ton under the American c.i.f. quotation. The order was placed on a March-April delivery basis, against the offer of the American mills of December delivery. In addition to the tender of the South Manchuria Railway Co., asking for 15,085 tons of 100-lb. rails, a separate tender closing Nov. 20 was issued about a week ago by the purchasing office of the Corean lines of this railroad, calling for 40 miles of 100-lb. rails (6285 tons). Bids on the larger tonnage will not be opened until Nov. 30. Of interest in connection with the tenders for furnishing electrical equipment for the Japanese railroads, now under consideration by American manufacturers, is the fact that of 42 electric locomotives now in operation in Japan, 36 are of British manufacture, four of American origin and two German. Buying for electrification of the railroads in Japan is expected to continue for the next four years.

Imports of German ingot aluminum are at present at a low ebb, both because of high prices prevailing in Germany and difficulty in obtaining it. German sheets, however, may be imported at about ½c per lb. under the prevailing American market. French and Swiss ingot aluminum, with the American market probably at about 22c per lb., are said to be possible of import at 15½c per lb., which, plus 5c per lb. duty, brings the price up to 20½c per lb.

NEXT QUARTER PRICES

Valley Sheet Mills Expect Present Quotations to Continue Into 1923

YOUNGSTOWN, Nov. 21.—With basic pig iron settling to $28, and lower quotations in sight for the first quarter of 1923, the trade's interest continues to be focused on steel prices which will apply in the next quarter. Already strip makers have announced their intention of carrying forward current quotations into the next quarterly period. It is the expectation in sheet mill circles that the prevailing minimums of 3.35c. on black and 4.35c. on galvanized, base gages, will represent the market on first quarter, 1923, tonnage.

The principal independent strip producer in this territory is booking tonnage for early next year delivery on the basis of 4.50c. for cold-rolled finishes, and 2.95c. to 3.15c. for hot-rolled flats. The narrower widths take the higher quotation. Strip demand continues firm among finished products, and is especially influenced by the heavy requirements of automobile builders.

In fact, independents anticipate that steel requirements of the automobile industry next year will be on a broader scale than at any time heretofore. Current requirements for full finished sheets, for instance, are in excess of mill capacity. Some of the more important automobile interests are pressing for next year's needs and are anxious to close contracts protecting their raw material supplies.

Automobile sheet seconds are scarce and difficult to obtain. The major motor car makers are mapping enlarged manufacturing programs for next year, say Valley steel interests. This will involve sustained requirements not only for highly finished sheets, but for ordinary grades, as well as for strips and merchant bars.

While new business in finishing lines, as well as in pig iron, sheet bars, billets and slabs, is slackening, due to approach of the inventory period, nevertheless, mills are maintaining operations on releases under existing contracts. Buyers are also holding back because of price unsettlement and uncertainties.

Black sheet business is spotty, largely reflecting immediate needs of consumers, and announcement of definite 1923 prices, for first quarter, will help to clarify the situation. While announcement of prices to apply will release some tonnage now held back, mills do not anticipate any large influx of orders. At present business is confined to 200 to 400-ton lots mostly, though some 1000-ton orders are being placed.

Sheet bars are selling down to $37, with comparatively little new business. The principal makers in this district are well covered over the next few weeks, and non-integrated interests report they have no difficulty in satisfying their needs.

Pipe is one of the strong spots in the finished market, and producers will enter the new year in strong position, especially in the buttweld sizes. There is much uncompleted construction throughout the country, which is sustaining buttweld needs. Oil and line pipe demand, while not so heavy as two weeks ago, nevertheless is still firm.

Buying of scrap metals shows little life and heavy melting is readily obtainable at $21. Compressed sheet steel is quotable at $20.

Syndicate Takes Over Sweet's Steel Co.

The Sweet's Steel Co., Williamsport, Pa., recorded a deed of trust on Nov. 17, securing an issue of $400,000 of first mortgage 6 per cent bonds, marking the completion of a $1,500,000 transaction. The deed of trust runs in favor of the First National Bank, Williamsport, and it is understood that the entire bond issue has been underwritten by local banks. Last September a syndicate headed by Joseph Kaye, Emporium, and D. F. Swartz, Williamsport, was granted an option on the estate of R. L. Ahles, formerly president, to purchase 90 per cent of the Sweet company's stock, and this option has been exercised. James B. Bailey, Philadelphia, president, Pine Iron Works Co., Pottstown, Pa., is a member of the syndicate whose officers will probably be: Joseph Kaye, chairman; John M. Young, president; Allen P. Perley, vice-president; Daniel F. Swartz, treasurer, and C. L. Peaslee, secretary.

Ohio interests, headed by L. A. Griffith, United Machine & Mfg. Co., Canton, Ohio, have acquired controlling interest in the James A. Brady Foundry Co., Chicago. Mr. Griffith will be president of the new organization.

PRESIDENT DETERMINED

Tone of Message Indicates White House Will Fight for Merchant Marine Bill

WASHINGTON, Nov. 21.—Realizing that it faces vigorous opposition, particularly in the Senate, President Harding's message to-day urging passage of the Administration ship subsidy bill was marked by an unusually strong tone. It had an air of defiance and even belligerency. The President showed such a determination to fight for the legislation as he possibly has not shown regarding any previous legislation since he has been President.

While the rules of the House are such that it likely will be possible to pass the bill on Nov. 29, such rules are not applicable to the Senate, where a bitter and possibly prolonged contest over the bill is expected, the outcome of which is problematical.

The President's message was clear and it convincingly explained the need of maintaining a privately owned merchant marine, both as a matter of national defense and of development of the foreign commerce of the United States. One of the points stressed by the President was that the legislation would reduce greatly the present high costs to the Government in maintaining ships under Government ownership and operation. He also appealed to the "farm bloc" apparently when he pointed out the value of a merchant marine to the agricultural interests.

Passage of the legislation before the present Congress expires, March 4, is considered to be extremely important because of the numerous radical members who will be in Congress after that time as the result of the recent elections.

Larger Use of Open Top Cars

WASHINGTON, Nov. 21.—Iron and steel interests are among those who will benefit by the order of the Interstate Commerce Commission which removes the preference that has been given to coal in the supply and movement of open top cars to and from points south of the Ohio and Potomac rivers. The order, issued in the form of amendment No. 2 to service order No. 25 became effective yesterday and applies to all railroads south of the Ohio and Potomac rivers except the Baltimore & Ohio. The condition of the latter carrier is still far from normal. The order amended five paragraphs of car service order No. 25.

The amendment means that the Southern lines will be in a position to supply open top cars, regardless of their height, to shippers of other products as well as coal and will not be required to maintain other conditions which had prevailed since Sept. 19, in order to expedite shipments of coal. It is provided, however, that any special priority which has been set up within the Southeastern territory under provisions of the Federal fuel distribution plan must be fulfilled.

Courses in Industrial Geography

Clark University, Worcester, Mass., is to establish correspondence courses in connection with its School of Geography. This will include courses for persons engaged in industry, and special mention is made in the prospectus of persons engaged in the handling of products of the mines, and those holding responsible positions in manufacturing enterprises, such as iron and steel plants, and in commercial firms, such as exporting and importing companies. Supplementary courses will give to these same classes of students more advanced instruction in specialized subjects, such as the geography of the iron and steel industry. President Wallace W. Atwood is the head of the School of Geography, but immediately in charge of the home study courses, as they will be called, will be Douglas C. Ridgley, recently of the Illinois State Normal University.

GERMAN PRICES UP 60 PER CENT

Advance Much Faster Than Mark Falls—Steel Rises More Than Iron

(By Radiogram)

BERLIN, GERMANY, Nov. 20.—Foundry iron No. 1 is now 110,173 m. per metric ton ($18.19 per gross ton, at 1⅝c. per 100 m.); ingots are 161,600 m. ($26.68); bars, 219,200 m. (1.62c. per lb.); thin sheets, 332,000 m. (2.45c. per lb.).

[These prices may be compared with those of Nov. 6, quoted on page 1225, Nov. 9. At that time foundry iron was 83,994 m. ($14.40, at 1⅛c. per 100 m.); ingots, 96,700 m. ($16.58); bars, 132,000 m. (1.01c. per lb.); thin sheets, 196,000 m. (1.50c. per lb.). The advance in two weeks, expressed in marks, has been 31 per cent in pig iron, 67 per cent in ingots, 66 per cent in bars and 69 per cent in sheets.

Since July 4, foundry iron, in marks, has advanced 15-fold, from 7261 m.; ingots have gone up 19-fold, from 8520 m.; bars, 19-fold, from 11,470 m.; sheets, 20-fold, from 16,490 m. In dollars, foundry iron has advanced 12 per cent, from $16.23; ingots, 40 per cent, from $19.04; bars, 41.5 per cent, from 1.145c. per lb.; sheets, 49 per cent, from 1.645c. per lb.]

Labor Conditions in the Valley Improve

YOUNGSTOWN, Nov. 21.—Operating and earning position of independent iron and steel interests in the Mahoning Valley is on a satisfactory basis for the fourth quarter. Labor supply is plentiful, due to the influx of men to the steel properties from outside employment. This applies particularly to unskilled labor. "We now have all the unskilled steel mill labor we need for full operations," states an independent executive. "Men who have been employed on outside work have been coming to the plants rapidly of late."

In view of this situation, it has been unnecessary for Valley employers to pay bonuses to secure men. For this same reason a wage advance, predicted in some quarters for Dec. 1, is declared unlikely by the independents. However, they say that they would follow the action of the Steel Corporation in any such procedure. Steel prices do not justify such a move at this time, which independent leaders believe would be inadvisable.

They point out that while some of the principal independents are now on an earning basis, they have passed through a period of depleted earnings and that most companies have sustained severe losses.

More Money for Federal Trade Commission

WASHINGTON, Nov. 21.—The Budget Bureau has approved an appropriation of $955,000 for the Federal Trade Commission for the fiscal year ending June 30, 1924. This is an increase of $55,000 over its appropriation for the present fiscal year and is $45,000 less than the amount the commission asked for, which was $1,000,000. The commission, it is stated, will employ additional attorneys and economists. There has been considerable interest as to how the commission would fare with the Bureau of the Budget. Unless Congress disapproves the action of the Bureau of the Budget, it may be assumed, however, it not only will be permitted to continue activities along its present lines but will be permitted to broaden and increase them.

The Westinghouse Electric & Manufacturing Co., Pittsburgh, plans to start operations in its newly acquired plant at Sharon, Pa., purchased from the Savage Arms Corporation, the first of next year. It will start one department at a time and production will be gradually increased, depending on the overflow from the company's plant at East Pittsburgh.

Iron and Steel Markets

TESTING OUT PRICES

Present Levels Likely in Sheets and Tin Plates

Heavy Consumption of Finished Steel—Pig Iron Lower with Large Buyers Inquiring

With operations well sustained at the high rate recently reached, which is but little under 80 per cent, consumption of steel keeps close step with production. New buying is still slack in view of the uncertainties as to prices for the first quarter of 1923.

The week's developments point to the continuance of the 3.35c. basis for black sheets and of $4.75 per base box for tin plate, though no announcement has been made by the Steel Corporation at this writing.

The testing out of the 2c. price for plates, shapes and bars shows that supply and demand are just now nearer an equilibrium in finished steel than in pig iron. Some mills have gone $1 to $2 a ton below the 2c. level, car material in particular showing concessions.

Some weakness has developed in hoops, bands and hot-rolled strip steel, as indicated by sales at 2.75c. as against 2.90c. recently. Wire and tubular products show more activity and more firmness than other lines.

Mills still have overdue deliveries of considerable volume and are counting on operating at the present rate well into the first quarter, barring winter blockades. Car shortages continue, but mills in the Pittsburgh and nearby districts, where congestion has been greatest, have not been obliged to add to their piled-up product.

The river barge shipments of finished steel from Carnegie Steel Co. mills, started this week, are expected to grow in importance.

The inquiries of the railroads have added from 175 to 225 locomotives and nearly 7000 cars to the pending lists. Actual purchases include 50 locomotives but not much over 500 cars.

Activity in fabricated steel work is still of unusual promise, involving awards of 21,000 tons in sizable projects and new inquiries of 37,000 tons. Three-fourths of the latter are covered by the Philadelphia-Camden bridge, a Missouri River bridge at St. Charles and a public service power station at Chicago. Bureau of Census figures for bookings in October were 122,000 tons, or 15 per cent less than the average of the last four months.

Automobile companies are still liberal buyers of steel bars, though deliveries on some of this business will not be made until late in the first quarter. Demand has sprung up also in the implement trade for steel bars and steel specialties.

Pig iron markets continue weak and declines of $1 to $2 on foundry and basic grades are noted in important Northern centers. But it is significant that large melters are quietly sounding the market and the buying of considerable tonnages at no distant date would not be surprising. The Pennsylvania Railroad has bought from 6000 to 8000 tons of foundry iron and the Steel Corporation has closed in the East for 6000 tons of basic for its Pencoyd plant. This last purchase is due to car shortage, preventing delivery of pig iron from Steel Corporation furnaces in the Pittsburgh district.

Ups and downs in blast furnace coke are being registered week by week and are keeping buyers on the alert. After selling as low as $6.50 late last week, standard beehive coke has strengthened to $7.25 and a contract for 23,000 tons, delivery to the end of the year, was put through at $7.50.

The coal market has been weakened by the closing of lake navigation and the lack of demand from other directions. Run of mine steam has been sold at $2.75 to $3.25.

Germany got the 5250 tons rails placed last week by the Imperial GovernmentRailways of Japan, at about $8 per ton less than the American bid. For the first time since the war it was given out by Japan that German bids would be entertained. This week 7000 tons of 100-lb. rails will be bought for Corea by the South Manchuria Railway Co. British mills expect the 21,370 tons of rails pending for Manchuria to go to the Continent.

The Standard Oil Co. has bought 150,000 boxes of tin plate in Wales for use in its foreign trade. At low prices Welsh mills have regained from the United States all their tin plate trade on Canada's Pacific Coast.

American inquiries have reached Great Britain for "hematite" iron on regular monthly shipments through the whole of 1923.

For the fourth successive week THE IRON AGE composite price for finished steel is at 2.446c. per lb.; this compares with 2.099c. one year ago and 3.581c. two years ago.

For the eighth successive week THE IRON AGE pig iron composite price has fallen, being now $27.61 per gross ton, compared with $32.54 at the end of September. One year ago it was $19.64; two years ago, $37.63 per ton.

Pittsburgh

Steel Prices Show Little Change—Pig Iron Market Is Weak

PITTSBURGH, Nov. 21.—Steel prices in the main are holding fairly well in this market, but the explanation is to be found in the fact that few mills as yet have felt the need of orders badly enough to meet the ideas of buyers as to value. Buyers plainly are uninterested in plates at 2c. Pittsburgh, although one important interest has turned down business carrying that figure. There is no question that well below the equivalent of 2c. Pittsburgh has been done by some makers. The situation as to prices of bars and shapes also is uncertain.

Independent sheet makers have found it necessary to go back to the Steel Corporation levels to get new orders for all finishes except automobile grades. Definite weakness has lately developed in hot-rolled flats, sales of which have been made as low as 2.75c. base Pittsburgh, or $3 per ton below the current price which most makers had adopted for first quarter contracts. There is no weakening in wire products nor in tubular goods, these lines showing activity which is largely lacking in almost all other finished products.

The pig iron market remains weak, although within

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Nov. 21, 1922	Nov. 14, 1922	Oct. 17, 1922	Nov. 22, 1921
No. 2X, Philadelphia‡	*$30.14*	$31.14	$33.14	$22.84
No. 2, Valley furnace†	*27.50*	28.00	32.50	20.50
No. 2, Southern, Cin'ti†	27.05	27.05	31.55	22.50
No. 2, Birmingham, Ala.†	23.00	23.00	27.50	18.00
No. 2 foundry, Chicago*	30.00	30.00	31.00	20.00
Basic, del'd, eastern Pa.	*27.50*	28.14	29.50	21.00
Basic, Valley furnace	*27.50*	28.00	30.00	19.00
Valley Bessemer, del. P'gh	*33.27*	33.77	35.27	21.96
Malleable, Chicago*	30.00	30.00	31.00	20.00
Malleable, Valley	29.00	29.00	33.00	20.00
Gray forge, Pittsburgh	*28.77*	29.77	32.77	21.46
L. S. charcoal, Chicago	36.15	36.15	36.15	31.50
Ferromanganese, furnace	100.00	100.00	67.50**	60.00**

Rails, Billets, etc., Per Gross Ton:				
O.-h. rails, heavy, at mill	$43.00	$43.00	$43.00	$40.00
Bess. billets, Pittsburgh	38.00	38.00	40.00	29.00
O.-h. billets, Pittsburgh	38.00	38.00	40.00	29.00
O.-h. sheet bars, P'gh	38.00	38.00	40.00	30.00
Forging billets, base, P'gh	45.00	45.00	45.00	32.00
O.-h. billets, Phila.	*43.17*	45.17	45.17	34.74
Wire rods, Pittsburgh	45.00	45.00	45.00	40.00
	Cents	Cents	Cents	Cents
Skelp, gr. steel, P'gh, lb.	2.00	2.00	2.00	1.60
Light rails at mill	2.00	2.00	2.00	1.55

Finished Iron and Steel, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	*2.275*	2.325	2.475	1.95
Iron bars, Chicago	2.50	2.50	2.50	1.65
Steel bars, Pittsburgh	2.00	2.00	2.00	1.50
Steel bars, Chicago	2.10	2.10	2.10	1.60
Steel bars, New York	2.34	2.34	2.34	1.80
Tank plates, Pittsburgh	2.00	2.00	2.15	1.50
Tank plates, Chicago	2.30	2.30	2.30	1.60
Tank plates, New York	2.34	2.34	2.34	1.88
Beams, Pittsburgh	2.00	2.00	2.00	1.50
Beams, Chicago	2.20	2.20	2.20	1.60
Beams, New York	2.34	2.34	2.34	1.88
Steel hoops, Pittsburgh	*2.75*	2.90	2.90	2.00

Sheets, Nails and Wire, *Per Lb. to Large Buyers:*	Nov. 21, 1922 Cents	Nov. 14, 1922 Cents	Oct. 17, 1922 Cents	Nov. 22, 1921 Cents
Sheets, black, No. 28, P'gh	3.35	3.35	3.50	2.75
Sheets, galv., No. 28, P'gh	*4.35*	4.50	4.50	3.75
Sheets, blue an'l'd, 9 & 10	*2.50*	2.60	2.60	2.25
Wire nails, Pittsburgh	2.70	2.70	2.70	2.75
Plain wire, Pittsburgh	2.45	2.45	2.45	2.50
Barbed wire, galv., P'gh	3.35	3.35	3.35	3.55
Tin plate, 100-lb. box, P'gh	$4.75	$4.75	$4.75	$4.75

Old Material, Per Gross Ton:				
Carwheels, Chicago	*$24.50*	$25.00	$25.00	$17.00
Carwheels, Philadelphia	*20.00*	21.00	23.00	17.00
Heavy steel scrap, P'gh	20.50	20.50	21.50	14.00
Heavy steel scrap, Phila.	*16.00*	16.50	18.00	12.00
Heavy steel scrap, Ch'go	*17.00*	17.50	18.50	12.25
No. 1 cast, Pittsburgh	*23.00*	23.50	24.00	16.50
No. 1 cast, Phila.	*20.00*	22.00	23.00	17.50
No. 1 cast, Ch'go (net ton)	20.50	20.50	21.00	13.25
No. 1 RR. wrot, Phila.	19.00	19.00	22.00	15.50
No. 1 RR. wrot, Ch'go (net)	*15.50*	16.00	17.75	12.00

Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	*$7.25*	$7.00	$10.00	$3.00
Foundry coke, prompt	*8.00*	8.50	12.00	4.00

Metals, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Lake copper, New York	14.12½	14.12½	14.12½	13.50
Electrolytic copper, refinery	13.62½	13.62½	13.62½	13.25
Zinc, St. Louis	*7.20*	7.25	6.85	4.65
Zinc, New York	*7.55*	7.60	7.20	5.15
Lead, St. Louis	6.90	6.90	6.35	4.35
Lead, New York	7.25	7.25	6.65	4.70
Tin (Straits), New York	*36.50*	36.87½	34.50	29.62½
Antimony (Asiatic), N. Y.	*6.50*	6.60	6.75	4.50

**c.i.f.

*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.

†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Composite Price, Nov. 21, 1922, Finished Steel, 2.446c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets

These products constitute 88 per cent of the United States output of finished steel

Nov. 14, 1922,	2.446c.
Oct. 24, 1922,	2.467c.
Nov. 22, 1921,	2.099c.
10-year pre-war average,	1.689c.

Composite Price, Nov. 21, 1922, Pig Iron, $27.61 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham

Nov. 14, 1922,	$28.86
Oct. 24, 1922,	30.02
Nov. 22, 1921,	19.64
10-year pre-war average,	15.72

the past few days some producers have shown more resistance to the downward tendency than they had previously. These producers are finding that their costs are practically even with selling prices; hence, their firmer stand with regard to prices. The market is at least 50c. per ton lower than a week ago and the decline runs to $1 a ton in some grades.

The coke market, after showing considerable weakness over the latter part of last week, turned strong to-day and advanced about 50c. per ton, due to rather big demands and some irregularity in car placements. This change is regarded as merely temporary unless there is some bad weather immediately ahead, and the fact that the demand for coal has dwindled sharply with the ending of the lake shipping season means that coal will be cheap enough to prevent permanent strength in coke.

The scrap market is extremely dull, but prices do not yield much, chiefly because dealers are figuring on the entrance of Carnegie Steel Co. into the market.

Transportation conditions are showing no appreciable change, although the Pennsylvania Railroad suspended its embargo on eastbound freight for the first three days of this week, and it is rumored that it will accept westbound freight during the last three days of the week. Car shortages continue, but on the whole it is doubtful whether any of the mills in this or nearby districts have been obliged to pile any more production. An interesting development in connection with transportation is that the Carnegie Steel Co. this week will inaugurate down river barge shipments of finished products. Neither rail conditions nor the insufficient supply of labor seems to be affecting blast furnace and steel plant operations. The Jones & Laughlin Steel Co. has all 12 of its blast furnaces in operation and is producing ingots at between 75 and 80 per cent of capacity. Other independents are doing almost as well and the blast furnace record for this week shows 92 out of 139 furnaces in blast, this including the new Claire Furnace at Sharpsville, Pa., which will be lighted Nov. 23, and the Scottdale, Pa., furnace of the McKinney Steel Co.

Pig Iron.—Such sales of Valley basic iron as have been made in this district in the past week have been at $28, including one lot of 2000 tons, and another of 500 tons. This price, however, is maximum and as there have been sales as low as $27, the market appears to be quotable at from $27 to $28. This grade is not above $27 at points which can compete with Valley furnaces, and it is hardly likely that more than this price now can be obtained. Merchant producers of foundry iron all are quoting $27.50 for the base grade at Valley furnace and most of the local sales of the week have been at from $27.50 to $28. The Westinghouse Electric &

Mfg. Co., however, recently closed for approximately 1000 tons of foundry iron for its Cleveland plant and it is reported did not go as high as the equivalent of $27, Valley furnace, for the iron. A producer having the same freight rate into Pittsburgh as Valley furnace, has offered No. 2 foundry at $27. There is not enough Bessemer iron on sale or wanted to establish prices. The one Valley interest which has any of this grade for sale is quoting $31.50, but iron of this grade can be bought at $31, Johnstown. Very little has been done on low phosphorus iron here lately and the price is nominal at $37, Valley furnace, for copper free.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being $1.77 per gross ton:

Basic	$27.00 to $28.00
Bessemer	31.50
Gray forge	27.00
No. 2 foundry	27.50 to 28.00
No. 3 foundry	27.00
Malleable	29.00
Low phosphorus, copper free	37.00 to 37.50

Ferroalloys.—The price of $100 furnace for 80 per cent domestic ferromanganese has found more basis in sales in the past week than before since it was announced. A Pittsburgh district steel company a few days ago closed for 2000 tons for immediate delivery at that figure. Several carload sales also have been made at that price which has been quoted on other inquiries, aggregating close to 1000 tons. The explanation for this development is found in the fact that the Turkish disturbance has practically shut off shipments of Caucasian ore and unrest is curtailing Indian production and shipments. Brazilian mines have been doing little during the past few months. British ferromanganese makers are said to lack enough ore to meet their sales and there is a possibility of higher British prices. British makers are meeting the American price, now quoting $100 f.o.b. Atlantic seaboard, duty paid. This represents a cut of $1.10 a ton from the former price of $67.50 c.i.f. seaboard, for 80 per cent material. There is little interest in other ferroalloys. An effort is being made to line up 1923 contracts for 50 per cent ferrosilicon at $82.50, delivered, but so far without much success. Current demands for this material are few and small and the common quotation is $75, delivered. Spiegeleisen is dull and weak. Domestic makers are quoting $38, furnace, for 20 per cent, but would take less on desirable tonnages, $35 being mentioned as a possibility on a large lot for delivery over a period. Domestic material hardly would command more than $41 delivered here since that is about the delivered price on imported spiegeleisen, duty paid. Bessemer ferrosilicon and silvery iron have been reduced $2 a ton.

We quote 80 per cent ferromanganese at $100, furnace, or $104.79 delivered Pittsburgh district for either domestic or British, and 76 to 80 per cent German at $67 c.i.f. Atlantic seaboard. Average 20 per cent spiegeleisen, $38, furnace; 16 to 19 per cent, $37 or domestic; 20 per cent foreign, $37 f.o.b. Atlantic seaboard, duty paid; 50 per cent ferrosilicon, domestic, $75, delivered, for spot delivery, $82.50 for 1923 shipment. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, $46.50; 11 per cent, $49.80; 12 per cent, $53.10; 13 per cent, $57.10; 14 per cent, $60.10; silvery iron, 6 per cent, $35; 7 per cent, $36; 8 per cent, $37.50; 9 per cent, $39.50; 10 per cent, $41.50; 11 per cent, $44.80; 12 per cent, $48.10. The present freight rate from Jackson and New Straitsville into the Pittsburgh district is $3.66 per gross ton.

Steel Skelp.—Makers still are quoting 2c. on sheared and grooved skelp, but sales are neither numerous nor large. Non-integrated pipe makers are not suffering much for supplies in spite of the fact that railroad conditions impede deliveries.

Wire Products.—Business still is coming along in good volume without much sales effort on the part of manufacturers. Since the leading interest still is heavily committed and is taking no new business, the distribution of orders is better than otherwise would be the case. The Steel Corporation wire-making subsidiary, however, is gaining steadily in plant operations and should be able before long to modify its sales policy. Car shortages and a lack of sufficient number of wire drawers combine to prevent normally full performance either as regard production or deliveries. Prices are unchanged. They are given on page 1391.

Iron and Steel Pipe.—The report still is that there is no let-up in the demand for standard pipe, particularly in the butt welded sizes. Car and labor shortages are preventing full performance against orders and few makers will accept new business for delivery in less than 60 days. As a general proposition, current shipments are about equal to current production, but no appreciable inroads are being made upon unshipped tonnages. The National Tube Co. will ship about 1500 tons of pipe by barge from its local mills, as part of a general down river shipment to be started this week by the Carnegie Steel Co. This is an experiment by the Steel Corporation. There is a fair demand for oil country and line pipe, but the mills are not heavily committed on these lines and reasonably early delivery is promised by most makers. Activity in wrought iron pipe also is chiefly in the butt welded sizes. Discounts are given on page 1391.

Wire Rods.—The market has lost none of its recent strength, chiefly because offerings are scant and none too plenty for the demand. The regular market is quotable from $45 to $47.50 for the base size of soft rods, but mills in a position to produce and to deliver promptly have obtained as much as $50 on a few small lots.

We quote No. 5 common basic or Bessemer rods to domestic consumers, $45 to $47.50; chain rods, $45 to $47.50; screw stock rods, $50 to $52.50; rivet and bolt rods and other rods of that character, $45 to $47.50; high carbon rods, $52 to $57.50, depending on carbon, per gross ton, f.o.b. Pittsburgh or Youngstown.

Billets, Sheet, Bars and Slabs.—Activity is lacking and prices are rather poorly defined. While occasional sales of billets and sheet bars, usually representing a pressing need, are being made at above $38, that seems the more common price on most inquiries now current. We note one sale of 5000 tons of sheet bars at $38, delivered, to a mill having a freight rate of about 50c. per ton from originating plant. Finished materials are not readily salable at to-day's quotations and non-integrated mills claim to be unable to pay $38 for billets and sheet bars and get out whole at below today's sheet and bar prices. Railroad conditions do not appear to be affecting steel works operations.

We quote 4 x 4-in. soft Bessemer and open-hearth billets, $37.50 to $38; 2 x 2-in. billets, $39; Bessemer sheet bars, $37.50 to $38; open-hearth sheet bars, $37.50 to $38; slabs, $38; forging billets, ordinary carbons, $43 to $45, all f.o.b. Pittsburgh or Youngstown mills.

Sheets.—It is expected that the American Sheet & Tin Plate Co. will continue its present prices for the first quarter of 1923, these being 3.35c., base, for black, 4.35c. base for galvanized and 2.50c. base for blue annealed. The independent market already is back to those levels, for the failure of the leading interest to name prices up to this time has been taken by buyers to mean there would be no change and they have held back orders. Independent mills, having only small backlogs, have found that to get new orders to take the place of completed ones it has not been possible to get more than the old American Sheet & Tin Plate Co. quotations. A little business in galvanized sheets has been done at 4.50c., but the prevailing price now is 4.35c. and similarly, sales of blue annealed sheets at above 2.50c., base, are the exception rather than the rule. On ordinary black sheets, 3.35c. is the going price and early shipments are promised at that figure by independent makers. On automobile body stock, the market is not quotable below 5c., base, for No. 22 gage. The leading interest will have little tonnage of this class for sale over the first quarter of the year and is not taking on new business. Mill operations are holding up well and the leading interest actually has made a slight gain. Prices are given on page 1391.

Tin Plate.—It is now believed that when the American Sheet & Tin Plate Co. announces its price for first quarter and half of 1923 shipments, it will not be over $5 per base box, Pittsburgh, and there is a possibility that it will not be that high, since a large order for delivery this year is understood to have been taken by an independent mill at $4.75. Not long after the present base was set up a year ago, price concessions appeared and very little production tonnage actually went on makers' books at much above $4.50 during the first half of this year. A price that is likely to hold will be named by the leading interest. General business is quiet, pending an announcement of prices.

Cold-Finished Steel Bars and Shafting.—Demands, though moderate in size, are well diversified, but the fact that hot-rolled bars have not yet gone below 2c. base is a prime influence in keeping up the price of cold-finished bars at 2.50c. base for carloads. Some of the automobile makers who recently suspended shipments have given releasing orders. Ground shafting is unchanged at 2.90c. base f.o.b. mill for carloads.

Hot-Rolled Flats.—While some makers report specifications against fourth quarter contracts to have increased and that there has been a fair amount of first quarter business, it is evident that this is not a general condition, for several sales lately at 2.75c., base, Pittsburgh, indicate that other makers need orders. The general asking price still is 2.90c. base, but a little "shopping" will uncover 2.75c. on both wide and narrow stock, though the tendency to shade at the moment is not pronounced in the latter. We now quote strips, hoops and bands at 2.75c. to 2.90c. The cotton tie season is over. Prices are given on page 1391.

Cold-Rolled Strips.—Buyers are specifying fairly well on fourth quarter contracts, but are moving slowly as to their future needs in the belief that they stand to lose nothing by waiting and may possibly gain by the weakness which lately has cropped out in hot-rolled strips. Makers still are holding generally to 4.50c. base, Pittsburgh, and as yet there have been no important deviations from that price.

Bolts, Nuts and Rivets.—Quoted prices show no particular change, but as the bulk of the orders on makers' books is at lower figures and specifications against these orders are not as heavy as they might be, there is reason to suppose that concessions could be had on attractive new orders. Steel prices are slightly weaker except in the case of rods, and while railroad conditions mean higher delivered costs than otherwise would be the case, there still remains a very fair margin for producers at less than quoted prices. Present indications are that first quarter of 1923 prices soon to be named will be about the same as those now quoted. Discounts are given on page 1391.

Track Fastenings.—We make no change in prices, the market being firm, not so much because of big demands, but because manufacturers are well supplied with orders and not yet anxious enough for additional bookings to be willing to shade prices. It must be stated, however, that quoted prices do not rule on many of the current deliveries. Steel is easier in price, but local plants still have to haul much of their requirements because of railroad transportation conditions. Prices are given on page 1391.

Boiler Tubes.—Makers are generally sold up against production over the remainder of the year and, it is probable, will be obliged to carry some business over into next year because of the difficulty experienced in getting full production on account of labor shortages. Prices on all classes of tubes are firm. Discounts are given on page 1391.

Steel Rails.—The Carnegie Steel Co. has a comfortable backing of orders for light rails and is not accepting orders for more prompt delivery than six to eight weeks. Most of the demands are for earlier delivery than that and that company, consequently, is not getting much of the current business. Its last price was 2.25c., base, and that price also is being named by an independent rail maker. As low as 2c., base, has been done, however, and 2.15c. constitutes the current maximum on new steel rails. Light sections rolled from old standard rails are held at 2c., base, but this is somewhat extreme on sales.

We quote 25 to 45-lb. sections, rolled from new steel, 2c. to 2.15c. base; rolled from old rails, 1.90c. to 2c. base; standard rails, $43 per gross ton mill for Bessemer and open-hearth sections.

Iron and Steel Bars.—Small lots of merchant steel bars are being sold at 2c. base Pittsburgh, but there are no big demands at this price, as buyers are convinced that they will do better by waiting. We make no change in iron bars.

We quote steel bars rolled from billets at 2c.; reinforcing bars, rolled from billets, 2c. base; rail steel reinforcing bars, 1.90c. to 2c.; refined iron bars, 2.60c. in carloads, f.o.b. mill, Pittsburgh.

Structural Material.—The largest structural project which has come up in the past week involves 6500 tons for the new Fortieth Street bridge over the Allegheny River, Pittsburgh. There are only three bidders, the McClintic-Marshall Co. being low at 5.28c. for 3600 tons of arches and spans and 4.22c. for 2800 tons of girder plate approaches. The American Bridge Co. bid 5.94c. and 4.88c., respectively, and the Fort Pitt Bridge Works 7.39c. and 4.77c. Work on this bridge will not be started until the spring of 1924. Structural shops are getting a fair run of inquiries, but most of them are for small jobs and the plain material market does not show very much activity. Most mills are quoting 2c., Pittsburgh, but do not find this price attractive to buyers. Prices are given on page 1391.

Plates.—Sales are not especially numerous and are usually for small tonnages, giving away some of the freight advantage by naming this price f.o.b. mill. Some makers who have recently sought tonnages have found 1.90c. as high as buyers are willing to go. About 1500 tons of plates will be wanted for 10 barges, bids on which have recently been asked by the Government at Rock Island, Ill. Prices are given on page 1391.

Rivets.—The market is not especially brisk either as regards specifications on contracts or new business. There is not much pressure to sell owing to the difficulties attendant upon deliveries of steel incident to the railroad situation. At the same time, $3.15 base per 100-lb. for large structural and ship rivets and $3.25 base for large boiler rivets are not readily obtained, especially as some makers still are quoting $3 per ton less. Prices and discounts are given on page 1391.

Coke and Coal.—After selling as low as $6.75 per net ton at ovens, late last week, the market here for a standard beehive oven furnace coke has strengthened and to-day $7.25 per net ton at oven was minimum, and a number of sales were noted at $7.50. Resumptions by blast furnaces using Connellsville coke have been fairly numerous lately and the available supply has been further reduced by irregular car supplies. A number of negotiations are in progress for first quarter tonnages, but buyers and sellers, at the moment, are apart on prices. We note one contract to run from Nov. 15 to Dec. 31, involving 23,000 tons at $7.50 at ovens. Foundry coke has declined to a normal alignment with furnace grade, now being quotable at $8 to $8.50 at oven. The coal market has been weakened by the closing of lake navigation and lack of demand from other consuming sources. We now quote mine run steam coal at $2.75 to $3.25 and mine run by-product and gas coal at from $3.50 to $4.

Old Material.—Loosening up in the Pennsylvania Railroad embargo is helping the delivery of scrap and has seemingly nipped a budding demand for tonnages for quick delivery. Under the modification of the embargo, the Pennsylvania Railroad will take shipments East on the first three days of this week. Some demand for heavy melting steel for delivery in 10 days at $21, was noted prior to this order, but the market now is dull and prices no more than steady on the steel works grades. Cast scrap is weaker in sympathy with pig iron.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate as follows:

	Per Gross Ton	
Heavy melting steel	$20.50 to	$21.00
No. 1 cast, cupola size	23.00 to	23.50
Rails for rolling, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va.; and Franklin, Pa.	21.50 to	22.00
Compressed sheet steel	19.50 to	20.00
Bundled sheet sides and ends	17.50 to	18.00
Railroad knuckles and couplers	22.50 to	23.00
Railroad coil and leaf springs	22.50 to	23.00
Low phosphorus standard bloom and billet ends	24.00 to	25.00
Low phosphorus, plates and other grades	23.00 to	24.00
Railroad malleable	21.00 to	21.50
Iron car axles	28.00 to	30.00
Locomotive axles, steel	23.00 to	24.00
Steel car axles	23.00 to	23.50
Cast iron wheels	23.50 to	24.00
Rolled steel wheels	22.50 to	23.00
Machine shop turnings		17.00
Heavy steel axle turnings	18.00 to	18.50
Short shoveling turnings	18.00 to	18.50
Cast iron borings	18.00 to	18.50
Heavy breakable cast	19.00 to	19.50
Stove plate	17.00 to	17.50
Sheet bar crop ends	24.00 to	24.50
No. 1 railroad wrought	20.00 to	20.50

Chicago

Finished Steel Prices Generally Firm—Railroad Car Buying Continues

CHICAGO, Nov. 21.—The week's bookings of a leading producer showed a slight gain over the average of the past few months. However, excluding specifications against a number of rail contracts which were included in this total, there was actually a small recession in strictly new tonnage, but not sufficient to be regarded as having any significance. Consumption of steel, a more dependable gage than bookings, shows no diminution. On the contrary, it would be even greater if producers could furnish the material. Firmness characterizes practically all finished steel prices and this is not surprising in view of the heavy bookings of mills. One producer is committed well into next quarter and another is now taking orders for shipment during that period at its previous prices. About 40 per cent of its capacity is already committed by rail and track supply contracts and the remaining tonnage available will be allocated among customers.

Railroad car buying still looms large as a factor in this market. The Chicago, Milwaukee & St. Paul has let tentative orders subject to the approval of the board of directors for 2000 box cars and 3000 gondola cars. Local mill protections on pending car inquiries aggregate 360,000 tons of steel, not counting 148,000 axles. In looking ahead the trade still regards it probable that the Pennsylvania and the New York Central lines will enter the market for 30,000 cars each.

An oil storage tank inquiry calls for 12,000 tons, and in addition to present mill protections covering 30,000 tons for building work in Chicago and vicinity, 67,000 tons additional is in immediate prospect.

Mill operations show another gain, the Inland Steel Co. having increased its steel production to 75 per cent of capacity. The Illinois Steel Co., which showed a gain in operations a week ago, has made no further additions to its active capacity. With local steel output on a 75 to 80 per cent basis, mills have recovered the ground lost during the twin strikes. Owing to transportation conditions, however, they have not yet been able to build up winter fuel reserves and the advent of severe weather might seriously affect their operations.

Ferroalloys.—Weakness is indicated by recent sales of both ferromanganese and spiegeleisen. Several hundred tons of ferromanganese were sold to a Chicago user at approximately $105, delivered. This material, however, was on cars and had to be moved to prevent the accumulation of demurrage charges. It appears that 80 per cent material is rather generally quoted at $2 under the former market of $67.50, tidewater, plus the duty. A local sale of 1100 tons of foreign spiegeleisen of 27 to 28 per cent manganese content, calling for delivery over the next four months, was closed at about $47, delivered. Eighteen to 22 per cent material is freely available at from $44.05, delivered, for large tonnages, to $46.05, delivered, for carloads. While there have been no sales to establish a market, 50 per cent ferrosilicon is quoted at from $75 to $80, delivered.

We quote 80 per cent ferromanganese, $106.66, delivered; 50 per cent ferrosilicon, $75 to $80, nominal, delivered; spiegeleisen, 18 to 22 per cent, $46.05 to $47.05, delivered.

Pig Iron.—Buying remains extraordinarily light, being limited to purchases of prompt iron. Melters generally are holding back their orders in anticipation of further price recessions. Local iron for prompt shipment has receded to a maximum of $30, base furnace, but the market on iron for forward delivery remains unlisted because of lack of sales. The dearth of buying cannot be attributed to reduced consumption. On the contrary, users are pushing the furnaces for deliveries against contracts, which would indicate that the melt in this territory is being maintained and that stocks on foundry yards are low. It would appear that in some instances stocks are reaching the point of exhaustion. A large Michigan automotive plant, in fact, has put out an inquiry for 18,000 tons of various grades for prompt shipment. While it cannot be denied that the market is weak, some observers are of the opinion that buyers may overplay their hands. There has been practically no first quarter buying and this must develop before the first of the year. There is also the danger that the advent of severe weather will cripple production, as furnaces have not yet been able to accumulate winter fuel reserves. Inquiries before the trade include 500 tons of foundry wanted by a Wisconsin melter for first quarter and 150 tons of low phosphorus wanted by a local plant for December shipment. Another local buyer is inquiring for 500 to 1000 tons of low phosphorus for delivery to an Eastern plant over the next three months. Little Southern iron has been sold, but $23 base Birmingham seems to be the minimum going price. After a period of instability, silvery has become established at $37.50, f.o.b. Jackson, for 8 per cent.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include an average switching charge of 61c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago	$36.15
Northern coke, No. 1, sil. 2.25 to 2.75	$31.00
Northern coke, foundry, No. 2, sil. 1.75 to 2.25	30.00
Northern high phos	30.00
Southern No. 2	$29.00 to 30.00
Malleable, not over 2.25 sil	30.00
Basic	30.00
Low phos., Valley furnace, sil. 1 to 2 per cent copper free	38.00
Silvery, sil. 8 per cent	42.29

Plates.—Of the railroad cars on inquiry which are covered by protections from local mills, those still unplaced number 38,500 and involve 360,000 tons of plates, shapes and bars, as well as 148,000 axles. An outer lake drive to be constructed in Grant Park, Chicago, will require 15,000 tons of plates, bars and shapes. Pending protections on oil storage tanks call for 10,000 tons of plates. The leading independent is now accepting business for first quarter shipment at 2.30c., Chicago mill, while the largest producer continues to book orders for indefinite delivery at 2.10c., Chicago. Occasional orders for early delivery are placed with Eastern mills at 2c., Pittsburgh.

The mill quotation is 2.10c. to 2.30c., Chicago. Jobbers quote 2.90c. for plates out of stock.

Cast Iron Pipe.—The pipe for a new sewage disposal plant at Indianapolis, amounting to 500 tons, will be furnished by the United States Cast Iron Pipe & Foundry Co. No other lettings are reported and no new tonnage is in immediate prospect; in fact, sales are so few that prices have almost become nominal. Pipe makers are well booked, however, and are not pressing for additional tonnage.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., $55.20 to $56.20; 6-in. and above, $51.20 to $52.20; class A and gas pipe, $3 extra.

Rails and Track Supplies.—Demand for bolts, spikes and tie plates is somewhat more active, but is confined to rather small lots. Current inquiries for bolts and spikes range from 500 to 1000 kegs. Prices are firm and unchanged.

Standard Bessemer and open-hearth rails, $43; light rails rolled from new steel, 2.15c., f.o.b. makers' mills.

Standard railroad spikes, 2.85c. to 3c. mill; track bolts with square nuts, 3.85c. to 4c., mill; iron tie plates, 2.50c.; steel tie plates, 2.35c., f.o.b. mill; angle bars, 2.75c., f.o.b. mill.

Jobbers quote standard spikes out of warehouse at 3.50c. base and track bolts, 4.50c. base.

Bars.—Demand for soft steel bars is still active, particularly for forward delivery. Prices of local mills remain unchanged, but the leading independent has opened its books for first quarter and expects that its available tonnage will be quickly absorbed by customers. No contracts will be accepted, but sales will be confined to orders with specifications attached. The automotive industry continues to require a large tonnage of bars. In fact, the production of an automobile plant in this vicinity in November promises to break all previous monthly records. Implement makers, although they entertain no hope of an early return

to normal operations, are encouraged by a very active demand for farm equipment from the South. New business in bar iron is not even heavy enough to employ the capacity of mills still in operation. The market remains firm, however, at 2.50c., Chicago mill. Hard steel bar makers are maintaining their previous rates of operation, but have not been able to build up a satisfactory backlog. Prices are unchanged at 2c., mill.

Mill prices are: Mild steel bars, 2c. to 2.10c., Chicago; common bar iron, 2.50c., Chicago; rail steel, 2c., Chicago mill.

Jobbers quote 2.80c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.80c. for rounds and 4.30c. for flats, squares and hexagons.

Jobbers quote hard and medium deformed steel bars at 2.25c. base; hoops, 4.15c.; bands, 3.55c.

Wire Products.—There has been a slight falling off in specifications, but it is not yet clear whether this is merely a temporary dip in demand or whether a quieter period is at hand, such as usually develops towards the close of the year. Several factors would argue for a sustained demand throughout the winter. It is to be noted that the leading interest has not yet succeeded in increasing its operations in proportion to the gains of producers of heavier products and that jobbers and manufacturing consumers have been unable to accumulate stocks. Continuance of open weather has prolonged the demand for nails in a large portion of the West and North and the South continues to be a heavy buyer of various forms of wire products. For mill prices, see finished iron and steel, f.o.b. Pittsburgh, page 1391.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire and No. 9 and heavier bright basic wire, $3.30 per 100 lb.; common wire nails, $3.45 per 100 lb.; cement coated nails, $2.90 per keg.

Bolts and Nuts.—Specifications are lighter, evidently reflecting a desire of users to keep their stocks down prior to taking inventory. No weakness in prices is to be noted, however, as sellers still have fair backlogs and look forward to a heavy demand with the turn of the year, basing their view on the undiminishing consumption of bolts and nuts. Among important users, the automobile industry is, in fact, running ahead of its previous production for this season. The September discounts still rule in this market.

Jobbers quote structural rivets, 3.75c.; boiler rivets, 3.85c.; machine bolts up to ¾ x 4 in., 50 per cent off; larger sizes, 50 off; carriage bolts up to ¾ x 6 in., 45 off; larger sizes, 45 off; hot pressed nuts, squares and hexagons, tapped, $2.75 off; blank nuts, $2.75 off; coach or lag screws, gimlet points, square heads, 55 per cent off.

Sheets.—The local independent is now accepting orders for first quarter at unchanged prices. It is not taking contracts, however, as it wishes to confine its new bookings to actual specifications. Eastern mills continue to book fair tonnages for early delivery in this market at the same prices.

Mill quotations are 3.35c. for No. 28 black, 2.50c. for No. 10 blue annealed and 4.35c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 34c. per 100 lb.

Jobbers quote f.o.b. Chicago, 4c. for blue annealed, 4.85c. for black and 5.85c. for galvanized.

Reinforcing Bars.—Lettings are numerous and the amount of business pending continues to increase, pointing to sustained building activity throughout the winter. One seller handled more business through his local warehouse in October than during any previous month on record and reports from other dealers are of a similar nature. Notwithstanding the unusual demand for reinforcing bars and the firmness of mill prices, warehouse quotations are still soft, most business being closed at about 2.25c. Recent awards include:

LeRue Popperfuss Hotel, Chicago, 500 tons, to Barton Spiderweb System Co.

Plant for Westinghouse Electric & Mfg. Co., Central Mfg. District, Chicago, 400 tons, to Kalman Steel Co.

Hayes Hotel building, Chicago, 220 tons, to Truscon Steel Co.

Warden Apartment Hotel, Fort Dodge, Iowa, 125 tons, to Truscon Steel Co.

Northern State Normal School building, Marquette, Mich., 266 tons, to Kalman Steel Co.

Overton Hygienic Mfg. Co. plant, Chicago, 100 tons, to Kalman Steel Co.

Bridge, Lansing, Mich., 200 tons, to Kalman Steel Co.

Illinois State road work, 125 tons, to Truscon Steel Co.

High school building, Superior, Wis., 100 tons, to Concrete Steel Co.

Greenwood School building, St. Paul, Minn., 250 tons, to Concrete Steel Co.

Grammar school building, St. Louis, Mo., 155 tons, to Concrete Steel Co.

Pending business includes:

State road work, near Faribault, Minn., 1500 tons.

U. S. Veterans' Hospital buildings, Knoxville, Iowa, 500 tons.

U. S. Veterans' Hospital, Chillicothe, Ohio, 500 tons, George A. Fuller Co. low bidder on general contract.

High school building, Evanston, Ill., 300 tons, bids on general contract to be in Dec. 7.

International Harvester Co., Chicago, warehouse at Cleveland, 400 tons.

Sewage disposal plant, Indianapolis, 1250 tons, general contract awarded to L. W. Hancock Co., Louisville, Ky.

Two public school buildings, Minneapolis, 1000 tons.

Third unit, Calumet power station, Commonwealth Edison Co., Chicago, 700 tons.

Roy E. Warner Co. garage, Louisville, Ky., 100 tons.

Hammond Hotel & Improvement Co., hotel, Hammond, Ind., 160 tons.

Structural Material.—New building work in Chicago and vicinity involves a total of 30,000 tons of steel and additional projects expected to go ahead within the next two months will account for 67,000 tons more. Prominent among pending jobs are a Missouri River bridge at St. Charles, Mo., requiring 10,000 tons, and the West Side power station of the Commonwealth Edison Co., Chicago, 8000 tons. While plain material prices remain unchanged, the Inland Steel Co. is now accepting orders for first quarter shipment.

The mill quotation on plain material is 2.10c. to 2.20c., Chicago. Jobbers quote 2.90c. for plain material out of warehouses.

Old Material.—Consumer buying is at a minimum and prices of a large number of grades have again dropped 50c. or more a ton. Buyers appear to have sufficient material on hand or on order to take care of their early requirements and they are not disposed to add to their stocks until inventory taking has been completed. While dealers have liquidated most of their holdings of prepared scrap, car repair shops are placing on the market a growing tonnage of unprepared material and increasing amounts of sorted scrap are coming from the industrial shops and the railroads. No general shortage of scrap is looked for, and unless another buying movement starts soon, further price recessions appear inevitable. Railroad offerings include the Wabash and the Grand Trunk Western lines, 3000 tons each; the Rock Island, 4000 tons, and the New York Central, a blank list.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	$22.50 to $23.00
Cast iron car wheels	24.50 to 25.00
Relaying rails, 56 and 60 lb.	26.00 to 27.00
Relaying rails, 65-lb. and heavier	32.00 to 35.00
Rolled or forged steel car wheels	22.00 to 22.50
Rails for rolling	18.00 to 18.50
Steel rails, less than 3 ft.	19.00 to 19.50
Heavy melting steel	17.00 to 17.50
Frogs, switches and guards cut apart	17.00 to 17.50
Shoveling steel	16.50 to 17.00
Drop forge flashings	12.00 to 12.50
Hydraulic compressed sheet	14.50 to 15.00
Axle turnings	15.00 to 15.50
Per Net Ton	
Iron angles and splice bars	21.50 to 22.00
Steel angle bars	17.00 to 17.50
Iron arch bars and transoms	21.00 to 21.50
Iron car axles	24.50 to 25.00
Steel car axles	18.50 to 19.00
No. 1 busheling	14.00 to 14.50
No. 2 busheling	9.50 to 10.00
Cut forge	15.00 to 15.50
Pipe and flues	11.00 to 11.50
No. 1 railroad wrought	15.50 to 16.00
No. 2 railroad wrought	15.00 to 15.50
Steel knuckles and couplers	19.50 to 20.00
Coil springs	21.00 to 21.50
No. 1 machinery cast	20.50 to 21.00
No. 1 railroad cast	19.00 to 19.50
Low phos. punchings	17.50 to 18.00
Locomotive tires, smooth	16.50 to 17.00
Machine shop turnings	9.50 to 10.00
Cast borings	13.00 to 13.50
Stove plates	16.50 to 17.00
Grate bars	16.00 to 16.50
Brake shoes	16.50 to 17.00
Railroad malleable	20.50 to 21.00
Agricultural malleable	20.50 to 21.00

New York

Suggestions of Resale Steel—Advanced Quotations for First Quarter— Quiet Buying of Pig Iron

NEW YORK, Nov. 21.—On the surface the pig iron market is dull, but important buyers are moving in a very quiet way, either to sound the market or place orders. One important melter of foundry iron has divided a considerable tonnage for early delivery between two sellers, but unusual pains have been taken to prevent details from becoming public. This buyer is said to have acted in the belief that it was important to obtain delivery early on account of the danger that heavy snows might add greatly to present embarrassments of the railroads. A Steel Corporation subsidiary has been a buyer of basic for an Eastern plant. Inquiries for malleable, noted last week, have resulted in orders being placed for at least a part of the tonnage. Further evidences of weakness have appeared, especially in Buffalo, where the $27 base can be shaded. In eastern Pennsylvania $29 is usually quoted, but it is understood that at least one seller will take orders at $28. In foreign irons, Continental grades continue to be quoted at $27 to $28, but Scotch is lower and can be had at $28.50, seaboard.

We quote delivered in the New York district as follows, having added to furnace prices $2.27 freight from eastern Pennsylvania, $4.91 from Buffalo and $5.44 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25	$33.27
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	32.27
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	31.27
Buffalo, sil. 1.75 to 2.25	31.91
No. 2 Virginia, sil. 1.75 to 2.25	No sales

Ferroalloys.—British 80 per cent ferromanganese is now quoted at $100 f.o.b. Atlantic seaboard, which practically means duty paid, instead of $67.50, c.i.f., the former quotation. American producers are quoting $100, furnace, and have taken some business. Sales of the British alloy in the last week have totaled about 2000 tons and inquiries before the market amount to about 1000 tons, one of which involves at least 500 tons. The market is more active than it has been in some little time. One large American producer will soon produce ferromanganese in the furnace which has lately been making pig iron. The spiegeleisen market is quiet with sales confined to a few small lots at $37 to $38, furnace, for the domestic product. A fairly good business has been done in 50 per cent ferrosilicon for delivery this year by steel producers needing more than they have contracted for and the market is strong at $80 to $85, delivered, with sales made on this basis. Imported 50 per cent ferrosilicon can be obtained at about $85, delivered. The ferrochromium market is moderately active at slightly firmer levels. Quotations are as follows:

Ferromanganese, domestic, furnace, nominal per ton	$100.00
Ferromanganese, British, 80 per cent, f.o.b. Atlantic port	$100.00
Spiegeleisen, 17 to 19 per cent, furnace	$36.00
Spiegeleisen, 20 per cent, furnace or duty paid	$37.00 to $38.00
Ferrosilicon, 50 per cent, delivered, per gross ton, carloads	$80.00 to $85.00
Ferrotungsten, per lb. of contained metal,	90c. to 95c.
Ferrochromium, 4 to 8 per cent carbon, 60 to 70 per cent Cr., per lb. Cr., delivered	13c. to 14c.
Ferrovanadium, per lb. of contained vanadium	$3.50 to $4.00
Ferrocarbontitanium, 15 to 18 per cent, in carloads, per net ton	$200.00
Ores	
Manganese ore, foreign, per unit, c.i.f.	29c. to 30c.
Tungsten ore, per unit, in 60 per cent concentrates, nominal	$7.50 to $8.50
Chrome ore, basis 48 per cent Cr_2O_3, crude, per ton, c.i.f. Atlantic seaboard	$18.00 to $25.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS_2, New York	55c. to 60c.

Finished Iron and Steel.—What weakness there is in steel prices is regarded as the outcome of the heavier shipments which the mills are now making on old orders, some booked at several dollars per ton below current figures. A portion of this steel is finding its way into construction jobs at prices which would not be profitable if the current prices were paid. The suggestion is that in some cases receipts are beyond current needs and resales have been made. The mills are holding with a deal of resistance to 2c., Pittsburgh, on shapes and bars, but plates are weak, and on any desirable tonnages less than 2c. has been quoted. One special lot of about 1000 tons has been sold at 1.85c., Pittsburgh. On less than 200 tons an important buyer was able to shade the 2c. price by $1 or $2 a ton. Bars for concrete work have also been sold below 2c., Pittsburgh, but this may have been resale material. While consumers generally are not suffering from shortage of steel, the transportation congestion is causing some difficulties. Jobbers' stocks are running low. There have been urgent demands for shipment of some forms of steel, particularly butt weld pipe and wire products. Notwithstanding present weakness in prices, there are intimations that mills will try to put into effect higher prices for first quarter. Whether conditions of supply and demand will sustain higher prices is yet to be determined, but it is interesting that a mill which was asked to quote on concrete reinforcing bars for first quarter named 2.10c., Pittsburgh, as its minimum. Independent sheet and tin plate companies are still waiting for the expected announcement of the Steel Corporation on prices for first quarter. A $2 advance on blue annealed sheets, $3 on black and galvanized and $5 on tin plate have been predicted, but the Steel Corporation has not officially indicated what its sheet and tin plate prices will be. The Carnegie Steel Co. has announced an advance of 10c. per 100 lb. on axles, and the general price is 2.75c., against 2.60c., recently obtaining. An inquiry for 1500 tons of black plate and 20,000 boxes of tin plate from the National Enameling & Stamping Co. is in the market. The American Locomotive Co. has bought 1300 tons of forging billets and 200 tons of plates. In concrete bars there is only fair activity, many projects having been postponed until the new year. The Truscon Steel Co., Detroit, will furnish 900 tons for the new Star automobile plant at Flint, Mich. The Concrete Steel Co. will furnish 120 tons for the South Side High School, Pittsburgh, and 210 tons for the Greenwood School, St. Paul, Minn. Dietrich Brothers, Baltimore, have been awarded an order for 1150 tons for the warehouse of the Terminal Refrigeration Co., Washington.

We quote for mill shipments, New York delivery, as follows: Soft steel bars, structural shapes and steel plates, 2.34c.; bar iron, 2.34c.

Cast-Iron Pipe.—Makers of water pipe report good business from private buyers and some interest in prices of pipe to be shipped next year. Much difficulty is being encountered in obtaining permits for shipment because of the car shortage. Makers at present are chiefly interested in the prospective tender of the City of San Juan, Porto Rico, for about 20,000 tons of cast-iron pipe. This is about the only municipal purchase evident. We quote per net ton, f.o.b. New York, in carload lots, as follows: 6-in. and larger, $54.50; 4-in. and 5-in., $59; 3-in., $64.80, with $4 additional for Class A and gas pipe. The soil pipe market is also unusually active for this season and makers report difficulty in obtaining sufficient cars to make shipments, although they are obtaining raw materials without much delay. We quote discounts of both Southern and Northern makers, delivered New York, as follows: 2 to 6-in. standard 33 to 35¾ per cent off list; heavy, 43 to 45¾ per cent off list.

Warehouse Business.—The market continues active with structural material still in good demand. In fact, most materials entering into building construction are still strong, despite the lateness of the season. Steel pipe has strengthened until there is little or no inclination to shade prices. Quotations on wire are firm and show an upward tendency. No change is reported in prices of brass and copper products out of stock and business in this line is good. Sheet prices have about settled to a basis of 4.50c. and 5.50c. per lb., base, on black and galvanized sheets respectively, although many warehouses officially quoting 4.90c. and 5.90c. per lb. base on black and galvanized claim to be still transacting business on these prices. On large lots better than the 4.50c. and 5.50c. per lb. are said to have been made. Warehouses report difficulty in obtaining shipments from mills and in making shipments to consumers because of the railroad embargoes and car shortage. We quote prices on page 1408.

High Speed Steel.—A slight improvement is evident and prices are firm at 75c. per lb. for 18 per cent

tungsten high speed steel with special brands of some companies ranging up to 90c. per lb.

Coke.—The coke market seems to be a trifle stronger. Connellsville grades are quoted at $8 to $8.50 and foundry and furnace at $6.75 to $7, but the market is firmer than it was a week ago. By-product coke is quoted at $14.84 to $14.91, delivered to Newark and Jersey City points.

Old Material.—Quietness continues, the Jones & Laughlin Steel Co. and the Bethlehem Steel Co. being about the only buyers active. No change is expected from the present dullness until dealers have cleared their books of shipments they are now making. Shipments are being made with considerable difficulty because of the embargoes on the railroads and the manifest shortage of cars even on roads which have no embargo in effect. According to shippers in this district conditions are not improving. For shipment to Bethlehem $16 per ton is being paid on railroad steel or equivalent and rejections are noted when material is not up to a high standard. No. 1 heavy melting steel is still going to the Jones & Laughlin Steel Co. at $20 per ton. Specification pipe is quotable at $10.50 to $11 per ton, based upon $14.50 being paid for shipment to a Lebanon mill. Stove plate still exhibits some activity in shipments to Harrisburg and to West Mahwah, N. J. From $13 to $14 per ton is a fair range of prices being paid in this market. Both machine shop turnings and mixed borings and turnings are weak at $11 to $11.50 per ton.

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard	$13.00 to $14.00
Steel rails, short lengths, or equivalent	14.25 to 14.75
Rails for rolling	16.00 to 16.50
Relaying rails, nominal	21.00 to 22.00
Steel car axles	No market
Iron car axles	26.00 to 27.00
No. 1 railroad wrought	15.50 to 16.00
Wrought iron track	14.25 to 14.75
Forge fire	11.00 to 11.50
No. 1 yard wrought, long	13.50 to 14.00
Cast borings (clean)	12.50 to 13.00
Machine-shop turnings	11.00 to 11.50
Mixed borings and turnings	11.00 to 11.50
Iron and steel pipe (1 in. diam., not under 2 ft. long)	10.50 to 11.00
Stove plate	13.00 to 13.50
Locomotive grate bars	14.00 to 14.50
Malleable cast (railroad)	13.50 to 14.00
Cast-iron car wheels	16.50 to 17.50

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast	19.00 to 20.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	17.00 to 17.50
No. 1 heavy cast, not cupola size	15.00 to 15.50
No. 2 cast (radiators, cast boilers, etc.)	13.50 to 14.00

Boston

Competition Keener as Business Falls Off—Transportation Outlook Bad

BOSTON, Nov. 21.—With every New England railroad embargoed by connecting lines and with the carriers in this territory placing embargoes against each other, the question of delivery of pig iron is fast supplementing that of price. Already connecting lines have failed to honor permits to load cars at Northern and Pennsylvania as well as Southern furnaces. With the carriers in New England clogged with loaded freight cars, there is a possibility of snow and ice demoralizing the transportation situation. Purchases of pig iron the past week showed a falling off. Competition between domestic and foreign irons is increasing with Buffalo and Alabama more aggressive than other domestic furnaces. Alabama is competing with certain grades of foreign iron, and Buffalo with regular analysis. Alabama is offered at $23, furnace base; Buffalo at $27; Scotch, silicon 2.50 to 3.00, at $28.50, duty paid on dock; English at $26.50, and Continental at $26. Eastern Pennsylvania No. 2X is available at $29, which brings the base price down to approximately $28, furnace. The purchase of 500 tons each of foreign high and low silicon and 300 tons of Buffalo by a Massachusetts textile machinery maker, and 500 tons foreign low phosphorus and about as much domestic malleable by a Rhode Island melter, and 1000 tons of foreign iron, analysis corresponding with our No. 2 plain by a Massachusetts heater maker, constitute the largest transactions. Other sales were in 100 ton lots and smaller with domestic furnaces getting the lion's share. Northern malleable is $1 lower at $27.

We quote delivered prices on the basis of the latest reported sales, now infrequent, and as follows, having added to furnace prices $3.65 freight from eastern Pennsylvania, $4.91 from Buffalo, $5.92 from Virginia and $9.60 from Alabama:

Eastern Penn., sil. 2.25 to 2.75	$32.15 to $34.65
Eastern Penn., sil. 1.75 to 2.25	31.65 to 33.65
Buffalo, sil. 2.25 to 2.75	32.41 to 33.41
Buffalo, sil. 1.75 to 2.25	31.91 to 32.91
Virginia, sil. 2.25 to 2.75	38.92
Virginia, sil. 1.75 to 2.25	37.92
Alabama, sil. 2.25 to 2.75	35.10
Alabama, sil. 1.75 to 2.25	34.60

Cast Iron Pipe.—The city of Springfield, Mass., this week will award 2550 lengths of 6- to 12-in. pipe and a small tonnage of miscellaneous other sizes. Boston will purchase a small tonnage of 14-in. pipe. Boston will receive bids until Dec. 1, on 90 tons of 6 in., 575 tons of 8 in., 50 tons of 10 in., 1550 tons of 12 in., 300 tons of 16 in., 550 tons of 36 in. and 200 tons of special pipe, a total of 3315 tons. No change in cast iron prices is reported.

Iron Imports.—During the week ending Nov. 18 receipts of iron at this port amounted to 5000 tons, consisting of 4500 tons of Middlesboro and 500 tons of Scotch. During the previous week no iron was received.

Warehouse Business.—The situation has not materially changed. Business in practically all kinds of iron and steel holds up well, with prices steady and unchanged. Bolts and nuts show a little more life than heretofore, and there is more being done in blacksmith supplies, especially horseshoes. Large rivets sell slowly, while small iron are scarce and in big demand, premiums being the rule in jobbing circles. The wire nails situation apparently is as acute as ever, all distributors having large numbers of back orders, and the cut nail position is not much better. Washers are not selling in proportion with bolts and nuts.

Jobbers quote: Soft steel bars, $3.065 per 100 lb. base; flats, $3.85; concrete bars, 3.16½c.; structural steel, $3.065 to $3.50; tire steel, $4.50 to $4.85; open-hearth spring steel, $5 to $6.50; crucible spring steel, $12; steel bands, $4.25; hoop steel, $4.75; cold rolled steel, $4 to $4.50; refined iron, $3.065; best refined iron, $4.50; Wayne iron, $5.50; Norway iron, $6.60 to $7.10; plates, 3.16½c. to $3.35; No. 10 blue annealed sheets, $4.15 per 100 lb. base; No. 28 black sheets, $5.40; No. 28 galvanized sheets, $6.40.

Coke.—An additional large tonnage of foundry coke for first half delivery has been taken by one New England by-product interest, at price ruling date of shipment. Both producers in this territory continue to quote on a basis of $16 delivered within the $3.10 freight zone. Their percentage of shipments to jobbing foundries is much smaller than to manufacturing interests, heater, stove and textile machinery makers being the largest consumers of fuel. Local shipments have slowed up somewhat, and because of the general transportation situation less Connellsville coke is offered here than heretofore. The fuel situation therefore appears tighter. Another lot of approximately 4000 tons of foreign coke arrived at this port the past week.

Old Material.—Old material prices are easier, the market falling under its own weight rather than to any pressure to sell scrap. A further contraction in both old and new business the past week is noted. Sales included a limited tonnage of heavy melting steel at $13.50 and $14; blast furnace borings and turnings at $11, as against $11.50 and $12 the previous week; and chemical borings at $17, down $1, with offerings larger than they have been in months. Machine shop turnings have declined 50c. and forged scrap and bundled skeleton $1, without much interest shown by dealers.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast	$22.00 to $22.50
No. 2 machinery cast	20.00 to 20.50
Stove plate	17.00 to 17.50
Railroad malleable	20.50 to 21.00

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$13.50 to $14.50
No. 1 railroad wrought	16.00 to 16.50
No. 1 yard wrought	14.00 to 14.50
Wrought pipe (1 in. diam., over 2 ft. long)	11.00 to 11.50
Machine shop turnings	11.00 to 11.50
Cast iron borings, rolling mill	12.50 to 13.00
Cast iron borings, chemical	16.00 to 17.00
Blast furnace borings and turnings	11.00 to 11.50
Forged scrap and bundled skeleton	9.50 to 10.00
Shafting	19.00 to 19.50
Street car axles	23.00 to 24.00
Street car wheels	17.50 to 18.00
Rails for rolling	15.50 to 16.00

Cincinnati

Buying Movement Expected Soon—Prices of Silveries Reduced

CINCINNATI, Nov. 21,—The general opinion in the pig iron trade is that a buying movement is near, and that within a week or two first quarter business will be in full swing. It is certainly a fact that very little interest has been shown in first quarter iron and sales to date for this delivery have been negligible. Some tentative inquiries have appeared, but usually end in the purchase of a carload or two for immediate shipment. Buyers are very shy of contracting very far ahead, and what orders are being placed are for prompt shipment. That stocks are low is evidenced by the requests being received to hurry and trace shipments now on the way. An inquiry from a Michigan melter for 18,000 tons for immediate shipment created a stir, while another Michigan melter is inquiring for 1000 tons of foundry for first quarter. Two malleable inquiries, more or less tentative, call for 3000 tons for first quarter. Sales include two 1000-ton lots of Southern iron at $23 and $25, Birmingham, respectively. On 300 tons of Southern Ohio Iron $30 was done, but on another inquiry for 200, $29 failed to take the order. It is reported that some Northern furnaces are willing to book first quarter business at $28, or $1 under to-day's market, but the attitude of Southern producers is the other way around. They will sell for December shipment at $23, base, but for first quarter are asking $24, and we note sales of 700 and 1000 tons to melters in other districts at this price. Silvery makers have reduced their schedule by $2 a ton, although it is said that some sales had been made at $3 below the old price. Basic is in little demand, but a number of small inquiries for Bessemer are current, and the price is firm at $32, Ironton.

Based on freight rates of $4.05 from Birmingham and $2.27 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	$27.05 to $28.05
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	27.55 to 28.55
Ohio silvery (nominal), 8 per cent	39.77
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	31.27
Basic Northern	30.27
Malleable	31.27

Finished Materials.—Orders placed are mostly for small lots, but there have been a number of these, and the aggregate tonnage is about equal to the total of last month. Bars and plates are showing fair activity, but shapes seem to be neglected. Sheets are in good demand; in fact, are as much sought after as has been the case for many weeks. An independent mill is reported to be willing to book business for first quarter at 2.60c. for blue annealed, 3.35c. for black and 4.35c. for galvanized, and is soliciting orders from large buyers at these figures. This is the only instance where prices for first quarter have been made. There is a fair demand for nails, but wire fence is extremely quiet. Pipe is showing continued activity, with deliveries not improved, for the transportation situation seems to be getting worse in this district, as a number of the roads have embargoed all shipments from certain points and this is said to be likely to happen from time to time during the next few weeks. A fair demand for light rails is reported from mining districts, with prices running around 2c., but little activity is noted in track fastenings, as roads have pretty well covered for this year's needs, at least, and some of them for the first half of next year. There is little activity in the structural field, although a number of small pending projects will take a considerable tonnage of reinforcing bars, made up largely of 50 to 75 tons each. Bids were taken recently on a portion of the sewage disposal plant for Indianapolis, for which 1200 tons of bars will be required. L. W. Hancock, Louisville, Ky., was low bidder on the general contract. The H. C. Godman Co., shoe manufacturer, Columbus, has plans prepared for the second unit of its new factory group, and bids will be asked shortly. This will be a concrete structure, requiring approximately 300 tons of bars. Competitive plans are to be asked for the War Memorial building at Indianapolis, and a coming project will be a number of buildings for the Stutz Motor Car Co. of America.

Warehouse Business.—A local jobber reports receipt of an order for approximately 200 tons of small angles from a West Virginia fabricator, and another for 70 tons from a district manufacturer. In both cases immediate delivery was required, so mill shipment could not be considered. Jobbers report a good demand for reinforcing bars and small angles, with prices holding very firm. On nails, $3.25 per keg, base, is becoming more common, as the demand exceeds the available supply. The demand for roofing sheets has been pretty well satisfied, though a few orders are still being placed by sheet metal contractors. Cold-rolled products are in fair demand.

Cincinnati jobbers quote: Iron and steel bars, 2.95c. base; reinforcing bars, 3.05c. base; hoops, 4.05c. base; bands, 3.85c. base; shapes and plates, 3.05c. base; cold-rolled rounds, 3.75c. base; cold-rolled flats, squares and hexagons, 4.25c. base; No. 10 blue annealed sheets, 4c.; No. 28 black sheets, 4.70c.; No. 28 galvanized sheets, 5.75c.; No. 9 annealed wire, $3.10 per 100 lb.; common wire nails, $3.20 per keg, base.

Tool Steel.—It now develops that the month of September was the best by far since 1920 with a number of manufacturers of tool steel, some of them having booked orders reminiscent of the early months of that year. The market last week showed fair activity, a number of small orders bringing the aggregate placed to a fair total. The price situation shows little change, and for 18 per cent tungsten high speed steel the price range is 75c. to 95c. per lb.

Coke.—There is little activity in the coke market, comparatively speaking, though we note one sale of 1000 tons for prompt shipment. An inquiry for 500 tons of foundry coke for first quarter is current, though most of the business is confined to one and two carloads. Prices are undergoing further readjustments. Connellsville foundry coke is unchanged at $8.50 to $9.50, but furnace has declined 50c. to $6.50. New River foundry has dropped $3 to $12, and Wise County foundry and furnace grades are off 50c. to $7 and $8.50 respectively. No coke is available from the Pocahontas field, and by-product is unchanged at $11, Connellsville.

Old Material.—The scrap market is spotty. Some of the steel mills in the district have been buying in small tonnages, particularly heavy melting steel and borings and turnings. On the latter, prices are stronger owing to the slightly increased demand and prices have been advanced $1. Old car wheels have been marked down 50c. Cast scrap, in only fair demand, is rather scarce and as a result prices are fairly firm.

We quote dealers' buying prices, f.o.b. cars Cincinnati:

Per Gross Ton	
Bundled sheets	$13.50 to $14.00
Iron rails	16.50 to 17.50
Relaying rails, 50 lb. and up	26.00 to 26.50
Rails for rolling	17.50 to 18.00
Heavy melting steel	16.50 to 17.50
Steel rails for melting	15.50 to 16.50
Car wheels	19.50 to 20.00
Per Net Ton	
No. 1 railroad wrought	14.00 to 14.50
Cast borings	11.50 to 12.00
Steel turnings	11.00 to 11.50
Railroad cast	17.00 to 18.00
No. 1 machinery	20.50 to 21.00
Burnt scrap	11.50 to 12.00
Iron axles	20.00 to 20.50
Locomotive tires (smooth inside)	14.00 to 15.00
Pipes and flues	10.50 to 11.00

Buffalo

Competition with Foreign Pig Iron Results in Lower Quotation

BUFFALO, Nov. 20.—Further weakness in price occurred the latter days of the week in the pig iron market when, to meet competition of foreign iron at New England points, No. 2 plain was quoted by a Buffalo seller at $26.50, No. 2X at $27 and No. 1 foundry at $28. All sellers are striving to maintain the one dollar spread. The charcoal iron price is firm and several transactions have been made lately at a price of $36.28, Buffalo. Malleable is firm at $28, and basis—if demand warranted—would be quoted at $27.75. An inquiry for 3000 tons of foundry iron by an Eastern buyer was considered by two Buffalo sellers, but information was not obtainable as to whether domestic or foreign iron filled the order. The same purchaser will be in the market for a like tonnage shortly. While there is a lively run of small tonnage orders, it has been found that Eastern consumers are disposed to hold

off until after Dec. 1—expecting to see a more stabilized market. A few first quarter contracts have been made, but the general attitude is one of waiting. The Wickwire Steel Company expects to have another furnace in blast early in December.

We quote f.o.b. per gross ton Buffalo as follows, the higher price being for early shipment:

No. 1 foundry, 2.75 to 3.25 sil.	$28.00
No. 2X foundry, 2.25 to 2.75 sil.	27.50
No. 2 plain, 1.75 to 2.25 sil.	27.00
Basic	27.75
Malleable	28.00
Lake Superior charcoal	36.28

Finished Iron and Steel.—Wire products and cold-finished material represent lines of steel products in greatest demand. Bars, shapes and plates are inclined to be quiet and premiums for delivery on bars seem to have disappeared; the quotation of 2c. is general. Non-announcement of tin plate prices has interfered with free commitment in this product and as soon as new prices are known it is expected a large volume of tonnage will be booked. Deliveries on tubular products and on wire are delayed and some of this material is sold four months ahead. There is no expectation that buying in any line will exceed actual needs until after Jan. 1; inventories already being considered because of the tax situation. The range of sheet prices is: Black, 3.35c. to 3.50c. and galvanized 4.35c. to 4.50c.—but the tendency is toward the lower figure. The 3.35c. and 4.35c. base is quoted by the Steel Corporation and a few independents. As a general proposition, deliveries are in better shape than in several weeks except in the instances mentioned above. The leading wire manufacturer finds strong pressure for delivery, with no tonnages available until January.

We quote warehouse prices, Buffalo, as follows: Structural shapes, 3.20c.; plates, 3.20c.; soft steel bars, 3.10c.; hoops, 4.10c.; bands, 3.90c.; blue annealed sheets, No. 10 gage, 4.05c.; galvanized steel sheets, No. 28 gage, 5.85c.; black sheets, No. 28, 4.85c.; cold rolled round shafting, 3.95c.

Coke.—Demand is very good with buyers interested at $8.50 per ton for good grades.

Old Material.—Consumers are not active and the general tone of the market is sluggish. None of the large buyers is interested and the general quietness is expected to remain in effect until the first of the year. Dealers are still filling old contracts at higher prices than prevail at this time and will not sell heavy melting steel at less than $20. Consumers might take small tonnages at $19 or $19.50, but that is the absolute high limit. No sales of heavy melting steel at less than $19.50 are known. Scrap production is light.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel	$19.00 to $20.00
Low phos., 0.04 and under	21.00 to 22.00
No. 1 railroad wrought	19.00 to 20.00
Car wheels	21.00 to 22.00
Machine-shop turnings	14.50 to 15.50
Cast iron borings	17.50 to 18.00
Heavy axle turnings	17.50 to 18.50
Grate bars	16.00 to 17.00
No. 1 busheling	17.00 to 18.00
Stove plate	17.00 to 18.00
Bundled sheet stampings	14.00 to 15.00
No. 1 machinery cast	21.00 to 22.00
Hydraulic compressed	18.00 to 19.00
Railroad malleable	20.50 to 21.50

St. Louis

Resale Iron Disposed of at $22 While Most Sellers Are Quoting $23

ST. LOUIS, Nov. 21.—It is difficult to say just what is the market on Southern pig iron, because of the wide range of prices. One lot of resale iron has been offered as low as $22, f.o.b. Birmingham. Most of the makers are quoting $23, one large concern is quoting $25, and still another, $27.50. The only sale of consequence was of a round tonnage to a stove plant at $23, but the reduction from last week's market of $25 failed to produce any other buying. Melters of both Southern and Northern iron, the price of which is unchanged, continue to play a waiting game, and the volume of business placed for first quarter delivery is almost nothing compared to what should have been placed at this period in the fourth quarter. Very little buying was done for fourth quarter delivery. And yet melters in the district in all lines have been doing a big business. Makers of Northern iron seem to be holding out against the melters' pressure for lower prices better than the Southern interests, as Northern iron is still being quoted on the basis of $30, Chicago, to compete with the price of $31 to $32 made by the St. Louis Coke & Chemical Co. A real test of the market will come when melters will look more to the future than their present policy of borrowing from their neighbors or buying a carload now and then. Plans are now being made to blow in the blast furnace of the Mississippi Valley Iron Co. about Jan. 1. It has a capacity of between 400 and 500 tons per day. It has been down for two years.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices $2.16 freight from Chicago, $3.28 from Birmingham (rail and water, $5.17 from Birmingham, all rail, and 81 cents average switching charge from Granite City:

Northern foundry, sil. 1.75 to 2.25	32.16
Northern malleable, sil. 1.75 to 2.25	32.16
Basic	32.16
Southern foundry, 1.75 to 2.25	28.17

Finished Iron and Steel.—The three largest fabricators of steel in the St. Louis district had orders on their books on Nov. 1 for about 14,000 tons of structural steel, about four months' work ahead. The same fabricators contracted for a total of about 3800 tons during October, and shipped approximately 3500 tons during last month. Inquiries have been received here for from 350 to 400 tons of reinforcing bars for the M. Rich & Bros. Co. building at Atlanta, Ga. One jobber bought two cars of wire nails during the week, and shipment was made within six days. Buyers of this material are insistent upon immediate shipment. Spring requirements for field fencing are beginning to be placed now, one concern ordering about 25,000 rods. Railroads are buying hardly anything. Inquiries sent out last week did not amount to more than two carloads.

For stock out of warehouse we quote: Soft steel bars, 2.90c. per lb.; iron bars, 2.90c.; structural shapes, 3c.; tank plates, 3c.; No. 10 blue annealed sheets, 4.10c.; No. 28 black sheets, cold rolled, one pass, 4.85c.; cold drawn rounds, shafting and screw stock, 3.90c.; structural rivets, 3.85c. per 100 lb.; boiler rivets, 3.95c.; tank rivets, $\frac{7}{8}$ in. and smaller, 55 per cent off list; machine bolts, large, 50 per cent; smaller, 50 per cent; carriage bolts, large, 45 per cent; small, 45 per cent; lag screws, 55 per cent; hot pressed nuts, square or hexagon blank, $2.75; and tapped, $2.75 off list.

Coke.—The Granite City by-product producer is very much behind on shipments, and reports that the demand is keeping up. It is operating at 100 per cent capacity, and has business booked up for about 60 days. Connellsville coke is still weak.

Old Material.—Buying of old material by consumers is light. They are inclined to wait until after the inventory period before taking on any more material, and the dealers are taking the same attitude. Users of old material are all busy, and it is expected that they will be in the market for heavy tonnages right after the first of the year. Prices are 25c. to 50c. lower on some items. There is a good demand for relaying rails from coal mines and other industrial concerns, heavy rails being mostly wanted. The biggest railroad list closing this week is that of the Wabash for about 3000 tons, of which 1000 tons is of scrap rails. The St. Louis Southwestern Railway has a list amounting to 600 tons and the Missouri-Kansas-Texas Railway, one of 800 to 900 tons.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton	
Iron rails	$20.00 to $20.50
Rails for rolling	17.00 to 17.50
Steel rails, less than 3 ft.	21.50 to 22.00
Relaying rails, standard section	26.00 to 29.00
Cast iron car wheels	23.00 to 23.50
Heavy melting steel	16.00 to 16.50
Heavy shoveling steel	15.50 to 16.00
Frogs, switches and guards cut apart	16.50 to 17.00
Per Net Ton	
Heavy axles and tire turnings	11.50 to 12.00
Steel angle bars	17.00 to 17.50
Iron car axles	27.00 to 27.50
Steel car axles	20.00 to 20.50
Wrought iron bars and transoms	21.50 to 22.00
No. 1 railroad wrought	15.50 to 16.00
No. 2 railroad wrought	15.00 to 15.50
Railroad springs	20.00 to 20.50
Steel couplers and knuckles	20.00 to 20.50
Cast iron borings	11.00 to 11.50
No. 1 busheling	13.00 to 13.50
No. 1 railroad cast	19.00 to 19.50
No. 1 machinery cast	20.00 to 20.50
Railroad malleable	18.00 to 18.50
Machine shop turnings	9.50 to 10.00

Cleveland

Pig Iron Prices Still Receding—Moderate Buying of Finished Products

CLEVELAND, Nov. 21.—Prices of pig iron have further declined from $1 to $2 a ton and the market still shows a downward tendency with little resistance to efforts of buyers to depress prices. The market shows more activity than for some time in the volume of inquiry, but some of the inquiries are regarded only as market feelers. The blowing in of one or more additional furnaces with few orders on their books is also tending to bring down prices. In the Valley district, foundry iron is no longer quoted above $28, and this price is not being maintained. Low quotations were brought out on an inquiry from the Westinghouse Electric & Mfg. Co. for 900 tons of foundry iron for its Cleveland plant for immediate shipment and this business is understood to have gone to a Valley furnace at under $27. Locally small lot sales of foundry iron have been made by Cleveland producers at $29 to $30, but sellers find these prices too high to take on much business. For outside shipment local furnaces are asking $28. No new basic inquiries have come out and sellers' views of the market range from $26.50 to $27.50. On a recent inquiry from an Ohio steel maker, a Cleveland producer quoted equivalent to $27.25, Valley, on a round lot of basic iron, but this price did not take the order. The purchase of 5000 tons of basic iron by the Central Steel Co. is confirmed, but the report of another 5000-ton sale to the same consumer by a Cleveland producer has proved unfounded. One large consumer has attempted to buy foundry iron around $27.50, Detroit. New inquiries include one from the American Radiator Co. for 1000 tons for Detroit and 1000 tons for Springfield, Ohio, and another from the American Car & Foundry Co. for 3000 tons for Detroit, all for immediate shipment. An Eastern pipe foundry is inquiring for 10,000 to 15,000 tons for first half. Southern iron is weak with a price range of from $23 to $25. The sanitary interest whose purchase of 1000 tons at $23 was reported last week later bought 1000 tons additional for November shipment at a $25 base. The latter order was for iron running 2.25 to 2.75 per cent in silicon for which the contract price was $25.50. A few small lot sales are reported at $24. Jackson county furnaces have made another $2 a ton reduction on silvery iron, which is weak at the new price.

Quotations below, except on basic and low phosphorous iron, are delivered Cleveland, and for local iron includes a 50c. switching charge. Ohio silvery and Southern iron prices are based on a $3.02 freight rate from Jackson and a $6 rate from Birmingham.

Basic, Valley furnace	$27.50
Northern No. 2 fdy., sil. 1.75 to 2.25	$28.50 to $29.50
Southern fdy., sil. 1.75 to 2.25	29.00 to 31.00
Malleable	29.50 to 30.00
Ohio silvery, nominal, sil. 8 per cent	40.52
Standard low phos., Valley furnace	37.00

Iron Ore.—The ore shipping season will be practically wound up this week. Independent ore firms will move very few more cargoes and the Pittsburgh Steamship Co. will send out no boats for ore cargoes after Tuesday. Shipments for the month will be about 3,000,000 tons, making a season movement of about 42,000,000 tons, as recently estimated. Lake Superior ore on hand at furnaces and Lake Erie docks Nov. 1 was 44,181,124 gross tons as compared with 39,071,003 tons on the same date a year ago. The amount at furnaces Nov. 1 was 34,594,890 tons as compared with 32,776,722 tons on Oct. 1. The consumption of lake ore during October was 4,012,007 tons as compared with 2,989,545 tons during September.

We quote delivered lower lake ports: Old range Bessemer 55 per cent iron, $5.95; Old range non-Bessemer, 51½ per cent iron, $5.20; Mesabi Bessemer, 55 per cent iron, $5.70; Mesabi non-Bessemer, 51½ per cent iron, $5.05.

Finished Iron and Steel.—New business is coming out only in moderate volume, but mills are getting small orders for steel bars, plates and structural material. Automobile companies are still buying material, particularly steel bars, in rather liberal quantities, and deliveries on some of the orders now being placed will not be made until late in first quarter. Some demand for steel bars and steel specialties has sprung up from the agricultural implement manufacturers. Prices are holding fairly well around recent levels. However, shading to 1.95c. by independent mills on steel bars in evidence a few weeks ago has again appeared on moderate sized lots for prompt shipment. Plates seem to be holding well at 2c., although there are reports that the 1.95c. price reported last week is being made in a few cases. On the other hand, small lot sales are still being made up to 2.25c. Plate deliveries have become easier. Structural material is unchanged at 2c. In structural lines, two local contracts that have been pending for some time, one for the Collinwood School and the other for a Jewish temple were placed during the week, and several new inquiries came out.

Jobbers quote steel bars, 2.91c.; plates and structural shapes, 3.01c.; No. 9 galvanized wire, 3.30c.; No. 9 annealed wire, 2.80c.; No. 28 black sheets, 4.15c. to 4.40c.; No. 28 galvanized sheets, 5c. to 5.40c.; No. 10 blue annealed sheets, 3.70c. to 3.76c.; hoops and bands, 3.71c.; cold-rolled rounds, 3.75c.; flats, squares and hexagons, 4.25c.

Semi-Finished Steel.—Prices on sheet bars, slabs and billets range from $37.50 to $38. The sale of 5000 tons of sheet bars to a Cleveland consumer at $37.50, Cleveland, or $38, delivered, is reported. A local producer sold 2000 tons of 2 x 2-in. billets during the week at $38, and several small lots of sheet bars and slabs at the same price.

Bolts, Nuts and Rivets.—Some new demand for bolts and nuts is coming from automobile companies and additional buying is being done by some of the railroad equipment builders. Prices are firm. Rivet manufacturers are getting some good orders for lots up to 300 tons from car builders. Manufacturers' prices appear firm, but there are reports of some shading on small lots by jobbers.

Old Material.—A Cleveland consumer has purchased 2000 tons of mixed borings and short turnings at $16.50 and this activity has caused this grade and cast borings to advance 50c. a ton. On the other hand, heavy melting steel scrap, owing to an absence of demand, is 50c. a ton weaker. The market continues very dull. Dealers have very few unfilled orders and consequently are buying very little material. Some of the mills are expected to come into the market within the next week or two. Activity in the railroad equipment field has stimulated the demand for low phosphorous melting scrap and sales of this grade are reported at $23, delivery Alliance, Ohio.

We quote per gross ton, f.o.b. Cleveland, as follows:

Heavy melting steel	$18.50 to $19.00
Steel rails under 3 ft.	20.00 to 20.50
Steel rails for rolling	20.00 to 20.50
Iron rails	18.00 to 18.50
Iron car axles	25.00 to 26.00
Low phosphorus melting	20.50 to 21.00
Cast borings	15.75 to 16.00
Machine shop turnings	14.50 to 14.75
Mixed borings and short turnings	15.50 to 16.00
Compressed steel	17.00 to 17.25
Railroad wrought	18.00 to 18.50
Railroad malleable	20.00
Light bundled sheet stampings	13.75 to 14.00
Steel axle turnings	16.00 to 16.50
No. 1 cast	20.50 to 21.00
No. 1 busheling	12.50 to 13.50
Drop forge flashings over 10 in.	12.75 to 13.25
Drop forge flashings under 10 in.	12.50 to 13.50
Railroad grate bars	17.00 to 18.00
Stove plate	17.00 to 18.00
Pipes and flues	13.00 to 13.75

Reinforcing Bars.—The demand for reinforcing bars continues active and the price appears firm at 2c. The George A. Fuller Co. has taken a general contract for buildings at Camp Sherman, Ohio, requiring 500 tons. The Bourne-Fuller Co. has taken 130 tons for the foundation for the Cleveland Public Library. The Pennsylvania Railroad has taken bids for grade crossing work in Cleveland requiring 120 tons, and A. Bentley & Sons, Toledo, have taken the general contract for the Orlando Hotel, Jacksonville, Fla., requiring 250 tons.

Sheets.—The only change in the sheet situation is an easing up in prices on blue annealed sheets. On these a minimum quotation of 2.60c. has been held by independent mills, but some of these mills are now quoting 2.50c. Quotations of 3.35c. for black sheets and 4.35c. for galvanized sheets are being made by many of the independent mills.

Coke.—Prices have further declined to $1 a ton on Connellsville foundry coke, which is now quoted at $8 to $8.50 for standard makes. Sales are limited to car lots.

Birmingham

Reports of Round Tonnages Placed—Large Consumers Sound Market

BIRMINGHAM, ALA., Nov. 21.—Some of the larger consumers have at least sounded the market, while in one iron office it was reported that there was confidential information to the effect that something like 40,000 tons of iron had been purchased at from $23 to $24. It was thought that these reported transactions would come to the surface this week. They could not be authenticated last week. One maker claims to have booked 1000 tons of low-grade iron at $24. Strictly local consumers offering $23 were turned down, but the tonnage involved was not enough to attract special consideration. Makers admit that iron has been sold in competitive territory at $23 and concede that the large buyers will probably enter the market on that base. At the same time, the pipe makers are very close to 1923 without providing for their first quarter requirements and they seem more inclined to trade than before. Statistically Southern iron will be strong at the end of the month.

We quote per gross ton f.o.b. Birmingham district furnaces as follows:

Foundry, silicon 1.75 to 2.25	$23.00 to $24.00
Basic	23.00 to 24.00
Charcoal, warm blast	32.00

Finishing Mills.—Wire drawing mills are twelve weeks behind in nail deliveries with other products on much the same basis. The Tennessee company's practically 100 per cent schedule is continued this week with rail mill again on a turn of 10,000 tons. A vessel is waiting at Mobile for 6000 tons of rails and other products for Japan and China. Structural and welded steel are fairly active for this time of the year.

Cast Iron Pipe.—There is very little new pressure pipe business, but shops are making deliveries in much better form, while the unfilled tonnage is still considerable. The base remains at $43. The soil pipe trade is still dull, with base of $50 to $55 not attracting the brokers. Unfilled tonnage is reaching a low point.

Old Material.—The scrap market has felt the reaction in the iron market, but yard men have been slow to mark down. In fact, they have not done so and small consumers usually pay the full quoted price, while larger ones are for the present out of the market.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails	$16.00 to $17.00
No. 1 steel	14.00 to 16.00
No. 1 cast	18.00 to 20.00
Car wheels	18.00 to 20.00
Tramcar wheels	17.00 to 19.00
Stove plate	16.00 to 17.00
Cast-iron borings	9.00 to 10.00
Machine shop turnings	9.00 to 10.00

The Carnegie Steel Co. is preparing No. 1 blast furnace in the Ohio works group for lighting. It is the only idle stack of six in the complement. Heavy operations of Carnegie company properties in the Mahoning and Shenango Valleys are responsible for the contemplated resumption. This will increase the number of active furnaces in the Mahoning and Shenango Valleys to 32, of the total 47 in the valleys.

Philadelphia

Further Weakness in Pig Iron and Scrap Prices With Light Buying

PHILADELPHIA, Nov. 21.—A further recession of $1 a ton in prices of foundry pig iron, a decline of nearly that amount in basic iron and general weakness in all grades of scrap stand out as the principal market factors of the week. Finished steel products hold their own to some extent, mills showing a disposition to resist a general level for plates, shapes and bars below 2c., Pittsburgh, though occasional sales at 1.90c. and 1.95c. are on record. Light buying of all products, due to year-end watchfulness of inventories and uncertainty over the trend of prices, is reported by producers, but there have been a few noteworthy sales of pig iron.

Pig Iron.—Sales of foundry and basic pig iron within the week record further weakness. Foundry iron has sold at as low as $28, furnace, for No. 2 plain, and at $29, furnace, for No. 2X, but up to to-day only one or two furnaces had made this reduction, and others reported sales at various figures ranging from $28.50 to $29.50 for No. 2 plain and from $29.50 to $30.50 on No. 2X. Quotations on No. 1X are quite uniformly, $1 a ton above No. 2X prices. Basic iron is quite generally obtainable at $26 to $26.50, furnace, and two sales within the week totaling 8000 tons or more were made at about this level. Sales of foreign iron are keeping pace with domestic sales and prices of foreign iron continue to go down, keeping just a shade under domestic irons of corresponding analyses. Receipts of foreign iron at the port of Philadelphia in the week ended Nov. 18 totaled 8149 tons, of which 4620 tons were from England; 1250 tons from France, and 2279 tons from Scotland, making a total of about 60,000 tons of iron received at Philadelphia from abroad since Oct. 1. The most interesting pig iron transaction of the week was the purchase by the Eastern structural steel subsidiary of the Steel Corporation of 6000 tons of basic. Though this plant is usually supplied by the furnaces of the corporation at Pittsburgh, the present car shortage made it seem advisable to cover for its nearby requirements in the East. Further purchases are considered probable. A steel company bought 2000 tons of basic. Both sales developed prices of about $27.50, delivered. The Pennsylvania Railroad has been the largest recent buyer of foundry iron, its purchases from two furnaces for the remainder of this year and first quarter totaling 6000 tons or more. A part of the Pennsylvania's purchase was classified as basic iron, but it presumably is to be used for foundry purposes. Of outstanding importance as affecting the immediate future course of pig iron prices is the fact that many of the furnaces now in blast are piling iron. In one instance, at least, this is due to the belief of the furnace owners that present weakness in prices is a passing phase, and that higher prices will be obtained within the next 60 days. This expectation is largely based on the assumption that colder weather with snow and ice will so seriously hamper the railroads as to create at least a temporary iron shortage. The total sales of four furnaces in Virginia now in blast are negligible compared with the tonnage being made, and practically all of this iron is going on the banks. There is no call for gray forge iron, but quotations would be at about $28 per ton, furnace, while malleable iron is obtainable at $30 to $31, furnace.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia and include freight rates varying from 76 cents to $1.64 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	$29.14 to $30.64
East. Pa. No. 2X, 2.25 to 2.75 sil.	30.14 to 31.64
East. Pa. No. 1X	31.14 to 32.64
Virginia No. 2 plain, 1.75 to 2.25 sil.	37.17
Virginia No. 2X, 2.25 to 2.75 sil.	38.17
Basic delivered eastern Pa.	27.50 to 28.00
Gray forge	29.14 to 30.14
Malleable	31.14 to 32.14
Standard low phos. (f.o.b. furnace)	38.00 to 40.00
Copper bearing low phos. (f.o.b. furnace)	35.00

Ore.—Receipts of foreign iron ore at this port totaled 4833 tons, all from French Africa.

Ferroalloys.—Representatives of British makers of ferromanganese are now quoting $100, seaboard, duty paid. Domestic makers continue to quote $100, furnace.

Coke.—Furnace coke is quoted from $6.50 to $7, Connellsville, and foundry coke $8 to $9, according to quality.

Semi-Finished Steel.—Not all of the Eastern mills have met the quotation of $38, Pittsburgh, which has been made by Pittsburgh mills on re-rolling billets. Forging billets are relatively firmer, and scarcely any of the Eastern mills are disposed at present to go lower than $45, while sales within the past week have been made at $47.50, Pittsburgh. Screw stock rods have been sold at $50, Pittsburgh, with full extras and wire rods at $50, Pittsburgh.

Plates.—From the mill viewpoint, the plate situation continues very unsatisfactory. Some of the mills are adhering firmly to a minimum of 2c., Pittsburgh, but admit that they are losing business because of lower quotations. It is not so difficult to obtain 2c. on specification plates as on ordinary tank quality, which, according to reports, is being quoted at 1.90c. to 1.95c., Pittsburgh. With Eastern mills ranging from 25 to 50 per cent operation and hungry for orders, a continuance of the 2c. level by any of the mills might appear untenable were it not for a feeling on the part of some companies that they would rather reduce operations still further than to continue piling up a loss with every sale. Regardless of whether it is possible for steel companies to make a profit on 2c. steel, it is held that it certainly can not be done with the low rate of operations which the plate mills have been held to in recent months. Some of the plate mills at the Cambria plant of Midvale Steel & Ordnance Co. are idle because of insufficiency of steel for all departments. The Cambria plant is operating at 90 per cent of capacity. About 1000 tons of plates has been ordered from an Eastern mill for 15 marine boilers for Great Lakes vessels. Locomotive work promises more plate buying. The Chicago, Milwaukee & St. Paul has ordered 50 locomotives from Baldwin Locomotive Works, with 50 more to be placed, and current inquiries total 175 engines.

Warehouse Business.—Quotations of jobbers for steel out of warehouse for local delivery are as follows:

Soft steel bars and small shapes, 3.025c.; iron bars (except bands), 3.025c.; round edge iron, 3.20c.; round edge steel, iron finish, 1½ x ½ in., 3.20c.; round edge steel planished, 4c.; tank steel plates, ¼-in. and heavier, 3.125c.; tank steel plates, ⅜-in., 3.33c.; blue annealed steel sheets, No. 10 gage, 3.85c.; black sheets, No. 28 gage, 4.60c.; galvanized sheets, No. 28 gage, 5.75c.; square twisted and deformed steel bars, 3.15c.; structural shapes, 3.125c.; diamond pattern plates, ¼-in., 4.80c.; ⅜-in., 5c.; spring steel, 4.25c.; round cold-rolled steel, 3.85c.; squares and hexagons, cold-rolled steel, 4.35c.; steel hoops, No. 13 gage and lighter, 4.25c.; steel bands, No. 12 gage to ⅜-in., inclusive, 3.825c.; rails, 3.025c.; tool steel, 8.50c.; Norway iron, 6.50c.

Structural Steel.—While new buying of strucural shapes is not large, mills are shipping freely on contracts, and many fabricators who bought material months ago at prices several dollars a ton lower than now prevailing are finding their wants fully supplied by the mills. Some of this business was placed prior to the coal crisis and shipment was delayed for months. Delivery of fabricated material on local construction jobs is held up. Delay in construction of the Museum of Art, Philadelphia, due to lack of the steel, has been the subject of much newspaper comment in the past week. Plain material is quoted at 2c., Pittsburgh, but it appears that this price has been shaded at least $1 a ton in some instances.

Bars.—Merchant steel bars are firm at 2c., Pittsburgh, and the mills have a comfortable amount of business on their books. In concrete reinforcing bars, there have been some concessions, usually $1 to $2 a ton. Bar iron is weak and current sales of a carload or more are usually at not more than 1.95c., Pittsburgh, though 2c. is the nominal asking price. Dietrich Brothers, Baltimore, have 1150 tons of bars to place for a building in Washington.

Sheets.—More mills are coming to the level of prices quoted by the American Sheet & Tin Plate Co., namely 2.60c. on blue annealed, 3.35c. on black and 4.35c. on galvanized. No official information has come out regarding the expected advance on sheets by the leading interest covering first quarter contracts, and there is a growing conviction that there will be no change in prices.

Old Material.—During the past week there have been price recessions on nearly every grade of scrap. A steel company bought a small tonnage last week at $16.50, delivered, but to-day would not offer more than $16. A larger independent has an open price of $16, delivered. All grades of cast scrap are lower. Steel axles are quoted at $22, delivered, by a large dealer, which is more than $5 a ton lower than the last reported sale several weeks ago.

We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel	$16.00 to $16.50
Scrap rails	16.00 to 16.50
Steel rails for rolling	19.50 to 20.00
No. 1 low phos., heavy 0.04 and under	22.00 to 23.00
Cast iron car wheels	20.00 to 21.00
No. 1 railroad wrought	19.00 to 20.00
No. 1 yard wrought	17.00 to 17.50
No. 1 forge fire	15.00 to 15.50
Bundled sheets (for steel works)	14.50 to 15.00
No. 1 busheling	14.50 to 15.00
Turnings (short shoveling grade for blast furnace use)	15.00
Mixed borings and turnings (for blast furnace use)	15.00
Machine shop turnings (for steel works use)	15.00 to 15.50
Machine shop turnings (for rolling mill use)	15.00 to 15.50
Heavy axle turnings (or equivalent)	15.50 to 16.00
Cast borings (for steel works and rolling mills)	16.00 to 16.50
Cast borings (for chemical plants)	22.00 to 23.00
No. 1 cast	20.00 to 21.00
Heavy breakable cast (for steel plants)	19.50 to 20.00
Railroad grate bars	16.50 to 17.00
Stove plate (for steel plant use)	16.50 to 17.00
Railroad malleable	15.50 to 16.50
Wrought iron and soft steel pipes and tubes (new specifications)	14.00 to 14.50
Shafting	21.00 to 22.00
Steel axles	22.00

Research Group Meets

PITTSBURGH, Nov. 21.—The technical division of the Electric Steel Founders' research group is meeting today and to-morrow at the William Penn Hotel here, with R. A. Bull, research director, presiding. The meeting is one of those held monthly to receive and discuss reports of the technical problem and research investigations of the group. Five companies are embraced by the organization and all are represented at the meeting, the Fort Pitt Steel Casting Co., McKeesport, Pa., by C. S. Koch; the Electric Steel Co., Chicago, by W. J. Nugent; the Michigan Steel Casting Co., Detroit, by H. A. Neel; the Sivyer Steel Casting Co., Milwaukee, by R. J. Doty, and the Lebanon Steel Foundry, Lebanon, Pa., by T. S. Quinn.

Will Ship Cars to Poland

WASHINGTON, Nov. 21.—The United States Shipping Board has entered into a contract with Paul Klopstock for the movement of about 3600 American-made flat cars from Norfolk to Danzig. These cars were purchased by Poland from the War Department and their movement will extend over a period from December, 1922, to July, 1923. The steamers operated by Moore & McCormack East Baltic Lines and by C. H. Sprague & Son will probably be used to handle this movement for the Board.

Duquesne Pattern Plant Damaged

PITTSBURGH, Nov. 21.—Fire on the evening of Nov. 20 damaged the upper floors of a four-story pattern storage building of the Duquesne Foundry Co., Coraopolis, Pa., and also the pattern shop. Two old buildings were destroyed. The company will not be obliged to suspend operations as a result of the fire.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Plates

Sheared, tank quality, base, per lb.....2.00c.

Structural Material

Beams, channels, etc.....2.00c.

Iron and Steel Bars

Soft steel bars, base, per lb.....2.00c.
Refined iron bars, base, per lb.....2.60c.

Hot-Rolled Flats

Hoops, base, per lb.....2.75c. to 2.90c.
Bands, base, per lb.....2.75c. to 2.90c.
Strips, base, per lb.....2.75c. to 2.90c.

Cold-Finished Steels

Bars and shafting, base, per lb.....2.50c.
Strips, base, per lb.....4.50c.

Wire Products

Nails, base, per keg.....$2.70
Bright plain wire, base, per 100 lb.....2.45
Annealed fence wire, base, per 100 lb.....2.45
Spring wire, base, per 100 lb.....3.25 to 3.35
Galvanized wire, base, per 100 lb.....2.95
Galvanized barbed, base, per 100 lb.....3.35
Galvanized staples, base, per keg.....3.35
Painted barbed wire, base, per 100 lb.....3.00
Polished staples, base, per keg.....3.00
Cement coated nails, base, per count keg.....2.20
Woven fence, carloads (to jobbers).....70½ per cent off list
Woven fence, carloads (to retailers).....68 per cent off list

Bolts and Nuts

Machine bolts, small, rolled threads...60 and 5 per cent off list
Machine bolts, small, cut threads....50 and 10 per cent off list
Machine bolts, larger and longer....50 and 10 per cent off list
Carriage bolts, ⅝ x 6 in.:
Smaller and shorter, rolled threads, 50, 10 and 5 per cent off list
Cut threads.....50 per cent off list
Longer and larger sizes.....50 per cent off list
Lag bolts.....60 and 5 per cent off list
Plow bolts, Nos. 1, 2 and 3 heads....50 and 10 per cent off list
Other style heads.....20 per cent extra
Machine bolts, c.p.c. and t. nuts, ⅝ x 4 in.:
Smaller and shorter.....45 per cent off list
Larger and longer sizes.....45 per cent off list
Hot pressed square or hex. blank nuts...$3.25 to $3.50 off list
Hot pressed nuts, tapped.....3.25 to 3.50 off list
C.p.c. and t. sq. or hex. nuts, blank.....3.25 to 3.50 off list
C.p.c. and t. sq., or hex. nuts, tapped.....3.25 to 3.50 off list
Semi-finished hex. nuts:
9/16 in. and smaller, U. S. S....75, 10 and 5 per cent off list
⅝ in. and larger, U. S. S.....70, 10 and 2½ per cent off list
Small sizes, S. A. E.....80 and 5 per cent off list
S. A. E., ⅝ in. and larger.....75 and 5 per cent off list
Stove bolts in packages.....80 and 5 per cent off list
Stove bolts in bulk.....80, 5 and 2½ per cent off list
Tire bolts.....50, 10 and 10 per cent off list

Cap and Set Screws

Milled square and hex. head cap screws....75 per cent off list
Milled set screws.....75 per cent off list
Upset cap screws.....75 and 10 per cent off list
Upset set screws.....80 per cent off list

Rivets

Large structural and ship rivets, base, per 100 lb., $3.00 to $3.15
Large boiler rivets, base, per 100 lb.....3.10 to 3.25
Small rivets.....65 and 5 to 65 per cent off list

Track Equipment

Spikes, 9/16 in. and larger, base, per 100 lb.....$2.75
Spikes, ½ in. and smaller, base, per 100 lb....3.50
Spikes, boat and barge, base, per 100 lb.....3.50
Track bolts, base, per 100 lb.....$3.85 to 4.50
Tie plates, per 100 lb.....2.35
Angle bars, base, per 100 lb.....2.75

Welded Pipe

Butt Weld

Steel Inches	Black	Galv.
⅛	49	23½
¼ to ⅜	55	29½
½	60	46½
¾	64	52½
1 to 3	66	54½

Iron Inches	Black	Galv.
⅛ to ⅜	+7	+33
½	26	8
¾	32	17
1 to 1½	34	19

Lap Weld

2	59	47½	2	29	15
2½ to 6	63	51½	2½ to 6	32½	19
7 to 8	60	47½	7 to 12	30	17
9 to 12	59	46½			

Butt Weld, extra strong, plain ends

⅛	45	28½	⅛ to ⅜	+15	+48
¼ to ⅜	51	34½	½	25	13
½	57	46½	¾	32	18
¾	62	51½	1 to 1½	34	20
1 to 1½	64	53½			
2 to 3	65	54½			

Lap Weld, extra strong, plain ends

2	57	46½	2	30	17
2½ to 4	61	50½	2½ to 4	33	21
4½ to 6	60	49½	4½ to 6	32	20
7 to 8	56	43½	7 to 8	25	13
9 to 12	50	37½	9 to 12	20	8

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 and 2½ per cent.

Boiler Tubes

Lap Welded Steel

1¾ in.	21½
2 to 2¼ in.	36
2½ to 3 in.	47
3¼ to 13 in.	52

Charcoal Iron

1½ in.	+7
1¾ to 1⅞ in.	3
2 to 2¼ in.	13
2½ to 3 in.	18
3¼ to 4½ in.	20

To large buyers of steel tubes a supplementary discount of 5 per cent is allowed.

Standard Commercial Seamless Boiler Tubes

Discounts on cold-drawn tubes in carload lots, f.o.b. Pittsburgh, follow:

1 in.	55	2½ and 2¾ in.	38
1¼ and 1½ in.	47	3 in.	42
1¾ in.	31	3¼ to 4 in.	47
2 and 2¼ in.	34	4¼ in. and 5 in.	39

Hot Rolled

3 in.	44	3¼ to 4 in.	49

Less carloads, 4 points less. Add $8 per net ton for more than four gages heavier than standard. No extras for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be sold at mechanical tube list and discount. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Carbon under 0.30, base.....85 per cent off list
Carbon 0.30 to 0.40, base.....83 per cent off list
Plus usual differentials and extras for cutting.

Seamless Locomotive and Superheater Tubes

Cents per Ft.		Cents per Ft.	
2-in. O.D. 12 gage	14	2¼-in. O.D. 10 gage	19
2-in. O.D. 11 gage	15	3-in. O.D. 7 gage	34
2-in. O.D. 10 gage	16	1½-in. O.D. 9 gage	13¾
2¼-in. O.D. 12 gage	16	5¾-in. O.D. 9 gage	53
2¼-in. O.D. 11 gage	17	5½-in. O.D. 9 gage	55

Tin Plate

Standard cokes, per base box.....$4.75

Terne Plate

(Per package, 200-lb.)

8-lb. coating	$9.30	25-lb. coating I. C.	$14.25
8-lb. coating I. C.	9.60	30-lb. coating I. C.	15.25
15-lb. coating I. C.	11.80	35-lb. coating I. C.	16.25
20-lb. coating I. C.	13.00	40-lb. coating I. C.	17.25

Sheets

Blue Annealed

Nos. 9 and 10 (base), per lb.....2.50c. to 2.60c.

Box Annealed, One Pass Cold Rolled

No. 28 (base), per lb.....3.35c. to 3.50c.
Regular auto body sheets, base (22 gage), per lb.....5.00c.

Galvanized

No. 28 (base), per lb.....4.35c. to 4.50c.

Tin-Mill Black Plate

No. 28 (base), per lb.....3.35c. to 3.50c.

Manufacturers have pamphlets, which can be had upon application, giving price differentials for gage and extras for length, width, shearing, etc.

Freight Rates

All rail freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic	$0.325	Buffalo	$0.265	St. Louis	$0.43
Philadelphia, export	0.235	Cleveland	0.215	Kansas City	0.735
Baltimore, domestic	0.315	Cleveland, Youngstown Comb.	0.19	Kansas City (pipe)	0.705
Baltimore, export	0.225	Detroit	0.295	St. Paul	0.595
New York, domestic	0.34	Cincinnati	0.295	Omaha	0.735
New York, export	0.255	Indianapolis	0.31	Omaha (pipe)	0.705
Boston, domestic	0.365	Chicago	0.34	Denver	1.275
Boston, export	0.255			Denver (pipe)	1.215

Pacific Coast	$1.50
Pac. Coast, ship plates	1.20
Birmingham	0.69
Memphis	0.385
Jacksonville, all rail	0.50
Jacksonville, rail and water	0.415
New Orleans	0.515

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 45,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 30c. to 40c.; ship plates, 30c. to 40c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 30c. to 40c.; sheets and tin plates, 50c.; rods, wire rope cable and strands, 75c.; wire fencing, netting and stretcher, 50c.; pipe, not over 8 in. in diameter, 50c.; over 8 in. in diameter, 2½c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

FABRICATED STEEL BUSINESS

Further Decline in Structural Sales

WASHINGTON, Nov. 20.—A marked seasonal decline in the sales of fabricated structural steel in October is announced by the Department of Commerce from reports made to the Bureau of the Census. October sales amounted to 54.9 per cent of shop capacity, compared with 61.6 per cent in September.

Reports received from 140 identical firms from April through October, with a shop capacity of 221,790 tons per month, show actual tonnages booked each month as given in the subjoined table together with the percentage of shop capacity represented by these bookings. A revision of these capacities in accordance with a uniform standard is now being undertaken by the Bureau of the Census but the results are not yet complete.

	Tonnage Booked	Per Cent of Capacity*
April	191,805	86.5
May	172,260	77.7
June	153,278	69.1
July	141,907	64.0
August	143,515	64.7
September	136,587	61.6
October	†121,763	54.9

*The inclusion of additional firms this month has made slight revisions in the per cent of capacity reported previously.

†October sales prorated for one firm which failed to report and represented about 1 per cent of the total.

Awards Call for a Round Tonnage and Numerous New Sizable Projects Appear

Among the fabricated steel awards of the past week are the following:

War memorial building, Baltimore, 500 tons, to unnamed fabricator.

Foundry building for Bartlett, Hayward Co., Baltimore, 700 tons, to American Bridge Co.

Power house at Terre Haute, Ind., 2200 tons, to McClintic-Marshall Co. Stone & Webster general contractors.

National Biscuit Co. building, Philadelphia, 3500 tons, to American Bridge Co.

Apartment house on West Sixty-fourth Street, New York, 300 tons, to Hay Foundry & Iron Works.

Extension, Kansas City Southern Railway shops, Pittsburgh, Kan., 540 tons, to Kansas City Structural Steel Co.

Missouri Portland Cement Co., kiln building and new raw building, Prospect Hill, Mo., 295 tons, to Mississippi Valley Structural Steel Co.

Missouri Pacific Railway, machine shop addition, St. Louis, 201 tons, to Mississippi Valley Structural Steel Co.

Johns-Manville, Inc., garage, Waukegan, Ill., 140 tons, to American Bridge Co.

St. Louis-San Francisco Railway, material for reinforcing bridges, 118 tons, reported last week, to American Bridge Co.

Glen Lake Sanatorium, Oak Terrace, Minn., 106 tons, to Crown Iron Works.

South Pittsburgh high school annex, 400 tons, to Jones & Laughlin Steel Co.

Addition to Eagles Club, Pittsburgh, North Side, 100 tons, to Jones & Laughlin Steel Co.

Fortieth Street bridge, Pittsburgh, 6500 tons, McClintic-Marshall Co. low bidder.

Oak Park, Ill., Trust & Savings Bank Building, 252 tons, to unidentified fabricator.

Stills for Standard Oil Co., 150 plates for Casper, Wyo., and 10 plates for Sugar Creek, 700 tons, to Midvale Steel & Ordnance Co.

Grand Tower, Ill., power station, Middle West Power Co., 1685 tons, to unidentified fabricator.

Ohio Pumping Machine Co., Akron, factory building, 215 tons, to the Massillon Bridge & Structural Co.

Collinwood High School, 1250 tons, to King Bridge Co.

Jewish Temple, Cleveland, 900 tons, to the Republic Structural Iron Works.

Structural Projects Pending

Inquiries for structural steel work now being figured on include the following:

Southern Railway, bridge, 200 tons.

Towers for Delaware River bridge connecting Philadelphia and Camden, N. J., 9400 tons.

Chesapeake & Ohio Railroad, bridge, 400 tons.

Bridge over Missouri River, St. Charles, Mo., 10,000 tons.

West Side power station, Commonwealth Edison Co., Chicago, 8000 tons.

Addition to Kaufmann's department store, Pittsburgh, 200 tons.

Masonic Temple, Muncie, Ind., 600 tons, bids close Nov. 22.

Rich Brothers, department store, Atlanta, Ga., 1880 tons.

Tanks, Casper, Wyo., for Standard Oil Co. of Indiana, 12,000 tons.

Board of Commissioners, Port of New Orleans, 450 tons for Seventh Street shed and 260 tons for grain elevator sacking plant.

Owens Bottle & Machine Co., Toledo, factory building, 275 tons.

Michigan Steel Corporation, Detroit, sheet mill, 1250 tons.

National Screw & Tack Co., Cleveland, factory building, 700 tons.

Pennsylvania grade crossing work, Cleveland, 1500 tons, bids taken.

J. W. Clement Co., Buffalo, building, 250 tons.

RAILROAD EQUIPMENT BUYING

Inquiries for Nearly 7,000 More Cars But Substantially No Purchases

Fresh inquiries for 6650 freight cars, some more offerings of car repair business and the purchase of 50 locomotives by the St. Paul are outstanding features of the week's developments in railroad equipment buying. The items include the following:

The Baltimore & Ohio Railroad is inquiring for 2000 55-ton hopper cars and 1000 70-ton gondolas. It has placed 500 box cars with the Hamilton Car Co., Newark, Ohio.

The Chicago, Milwaukee & St. Paul Railroad has placed an order with Baldwin Locomotive Works for 50 locomotives, and will probably order 50 more soon.

The Chicago, Burlington & Quincy Railroad is in the market for 85 locomotives.

The Baltimore & Ohio is inquiring for 75 locomotives.

The Lehigh Valley Railroad is in the market for 15 locomotives.

The Pere Marquette is expected to close for 1500 box and 500 hopper cars this week.

The Northern Pacific also expected to place orders for 3000 box cars this week.

The Spokane & International is inquiring for 50 flat cars.

The Monon is in market for repairs on 500 gondola cars.

The Detroit, Toledo & Ironton is inquiring for repairs on 500 gondola cars.

The Ford Motor Co. is in market for steel underframes for 500 40-ton box cars.

The Elgin, Joliet & Eastern placed repairs on 500 gondola cars with James G. Heggie & Sons.

The Pittsburgh, Shawmut & Northern is inquiring for 200 stock cars.

The Pennsylvania Tank Car Co. is in the market for 300 tank cars.

The United States Fuel Co. is inquiring for 300 steel narrow-gage mine cars.

The El Paso & Southwestern has ordered 4 passenger cars from the Pullman Co.

The Atlanta & West Point is inquiring for 150 hopper cars and 2 baggage cars.

The Brooklyn Rapid Transit is in the market for 50 passenger bodies and 100 passenger car trucks.

The Long Island is inquiring for 40 motor cars and 20 trailers, 10 steam passenger cars and 20 trailers and 2 baggage and mail cars.

The Central of New Jersey has increased its order with American Car & Foundry from 20 to 45 steel coaches.

Wheeling District Steel Plant Operations

WHEELING, W. VA., Nov. 20.—While this week's schedule of steel plant operations in this district shows recessions here and there, the general tendency is toward a higher rate. The Weirton Steel Co., with plants in Weirton and Clarksburg, W. Va., and Steubenville, Ohio, went on a 100 per cent basis this morning, when its Clarksburg plant, which has been running at two-thirds capacity, went on full. A large order for tin plate for shipment to Alaska, deliveries to be completed by the end of the year, is understood to have been taken by this company and to have necessitated full operation of its tin plate units.

Operations of the Laughlin plant of the American Sheet & Tin Plate Co., Martins Ferry, Ohio, have been increased from 65 per cent to 87 per cent, with 20 of the 23 hot mills there being on.

NON-FERROUS METALS

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Straits Tin	Lead		Zinc	
Nov.	Lake	Electrolytic*	New York	New York	St. Louis	New York	St. Louis
15	14.12½	13.62½	37.12½	7.25	6.90	7.65	7.30
16	14.12½	13.62½	36.50	7.25	6.90	7.65	7.30
17	14.00	13.62½	36.50	7.25	6.90	7.65	7.30
18	14.00	13.62½	....	7.25	6.90	7.60	7.25
20	14.00	13.62½	36.75	7.25	6.90	7.55	7.20
21	14.12½	13.62½	36.50	7.25	6.90	7.55	7.20

*Refinery quotation.

New York

NEW YORK, Nov. 21.

Demand is light in all the markets. The copper market is firm but dull. Buying of tin is moderate at lower prices. The lead market is unchanged. A slight reaction in the zinc market has set in.

Copper.—Statistics concerning the copper market are closely guarded, but sufficient is now known to make the statement that shipments in October to domestic consumers exceeded by far any month of the year, and those to foreign consumers were equal to the year's previous high mark. Up to within the last day or two domestic buying had been fairly good and so had foreign sales, but the market has now turned quiet. Quotations are firm at 13.62½c., refinery, or 13.87½c., delivered, with Lake copper selling at 14c. to 14.12½c., delivered.

Tin.—Sales of Straits tin in this market during the week totaled 800 to 1000 tons at prices close to 36.50c. to 36.75c. On Nov. 15 about 300 to 350 tons of spot metal and metal afloat was sold, practically to one consumer, at 37.12½c. On Nov. 16 from 300 to 500 tons is estimated to have changed hands, with dealers the largest buyers and importers the sellers. On Nov. 17 150 to 200 tons of December-January shipment was sold mostly to one dealer. Since then and including to-day the market has been dull and featureless. Spot Straits tin is quoted to-day in New York at 36.50c. and the London quotations were about £2 per ton lower than a week ago at £178 for spot standard, £178 15s. for future standard, and £179 15s. for spot Straits. There is a wide difference of opinion in the trade as to the extent to which consumers are covered for their future requirements. The recent speculation in the London market is attributed largely to the fact that one operator believes these requirements are not covered much beyond December. The fact, however, that the quantity of metal reported afloat is so large, at 9335 tons, should be taken into account, particularly if most of this metal represents sales on contracts. Arrivals thus far this month have been 3670 tons.

Lead.—Conditions in this market are practically unchanged both as to supplies and quotations. November lead is unobtainable and sales for December shipments have been made at 7.25c., New York, by independents. The St. Louis outside market is slightly stronger at 6.90c. to 6.95c. The quotation of the leading interest remains unchanged at 6.80c., St. Louis, or 7c., New York.

Zinc.—A moderate reaction has appeared in this market and prime Western zinc is now quoted at 7.20c., St. Louis, and 7.55c., New York, or about 10 points below the levels a week ago. Domestic buying has nearly ceased and offerings for export have not been accepted as freely as they have been made. The appearance of a slight reaction is not regarded with alarm, but is accepted as a healthy sign.

Antimony.—The market is unchanged and featureless with Chinese metal in wholesale lots for early delivery quoted at 6.50c., New York, duty paid.

Aluminum.—Virgin metal, 98 to 99 pure, made by foreign producers, is quoted by importers in wholesale lots for early delivery, at 21c. to 22c. per lb., New York, duty paid. The price at which the leading interest is taking orders is still withheld.

Old Metals.—The market continues firm and business is fairly active. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible	13.50
Copper, heavy and wire	12.50
Copper, light and bottoms	11.25
Heavy machine composition	10.25
Brass, heavy	8.25
Brass, light	6.50
No. 1 red brass or composition turnings	9.50
No. 1 yellow rod brass turnings	7.75
Lead, heavy	6.25
Lead, tea	5.00
Zinc	5.00

Chicago

Nov. 21.—Tin, lead and spelter have declined, while copper and antimony remain unchanged. The recession in lead and spelter is taken to indicate that these metals have passed the crest of the recent upward movement. Demand is not at all brisk for either metal and, but for the fact that stocks are said to be low, a sustained decline would be expected. Buying of copper has been fair, but this metal is not likely to advance because supplies of both new and second-hand material are large. We quote, in carload lots, lake copper, 14.37½c.; tin, 37.50c. to 38c.; lead, 6.95c.; spelter, 7.30c.; antimony, 8.50c., in less than carload lots. On old metals we quote copper wire crucible shapes and copper clips, 11.50c.; copper bottoms, 9.75c; red brass, 9c.; yellow brass, 7c.; lead pipe, 5.25c.; zinc, 4.75c.; pewter, No. 1, 23c.; tin foil, 26c.; block tin, 30c., all buying prices for less than carload lots.

More Metal Workers and Higher Wages

Iron and steel plants, according to figures of the Bureau of Labor Statistics, show for October a gain from September of 7717 employees in 140 establishments. This gain of 4.6 per cent was accompanied by a gain of 9.8 per cent in amount of payroll and a corresponding increase in the average pay envelope from $53.48 to $56.15, or 5 per cent.

In the automobile industry there was a loss in 118 establishments of 5.9 per cent in number of employees, but a gain of 0.9 per cent in payroll total, and 7.3 per cent in average pay envelopes. In car building and repairing there was a gain of 13.7 per cent in number of employees in 73 establishments and a gain of 13.8 per cent in amount of payroll.

Compared with a year ago there has been a gain in 216 establishments which reported at both times of 24.2 per cent in number of men employed, and an increase of 45.7 per cent in total payroll. This connotes a gain of 11.7 per cent in contents of the average pay envelope, which has advanced from $53.21 to $62.42.

Wages per half-month per man in automobile plants which are exceptionally busy, are 24.3 per cent over those prevailing in steel plants. In fact, 171,892 automobile workers received over $2,000,000 more in the half month than did 176,387 steel workers.

Compared with September, average per capita earnings increased in 29 industries and decreased in 14.

Details are shown in the table.

Period	Number of Establishments	Number of Men	Half-Month Payroll	Average Pay Envelope
Iron and Steel				
Sept., 1922...	140	168,670	$9,019,313	$53.48
Oct., 1922...	140	176,387	9,903,466	56.15
Oct., 1921...	112	114,267	4,714,553	41.26
*Automobiles**				
Sept., 1922...	118	182,726	11,881,688	65.02
Oct., 1922...	118	171,892	11,992,082	69.77
Oct., 1921...	48	100,974	6,444,111	63.80
Car Building and Repairing				
Sept., 1922...	73	66,810	3,754,348	56.20
Oct., 1922...	73	75,932	4,271,514	56.25
Oct., 1921...	56	40,050	2,423,397	60.51
Metal Workers (the three groups above)				
Sept., 1922...	331	418,206	24,655,349	58.96
Oct., 1922...	331	424,211	26,167,062	61.68
Oct., 1921...	216	255,291	13,582,061	53.21

*Payroll figures are reported as "weekly"; they have been made "half-monthly" by multiplying by 2 1/6.

PERSONAL

Paul M. Lincoln, after nearly 30 years of practical engineering experience, has accepted the position as director of the school of electrical engineering of the College of Engineering, Cornell University, to succeed Prof. Alexander Gray, deceased. Mr. Lincoln graduated from Ohio State University in 1892, and after being connected for a time with the Short Electric Co., Cleveland, went to Pittsburgh to take up work with the Westinghouse Electric & Mfg. Co., in December, 1892. After about two and one-half years with that company he became electrical superintendent of the Niagara Falls Power Co., Niagara Falls, N. Y. This was at the time of the beginning of the modern phase in the water power development of Niagara Falls, for which the Westinghouse company had built the generators and other electrical equipment. The seven years, 1895 to 1902, which Mr. Lincoln spent as electrical superintendent of the Niagara plant, were among the most interesting and profitable of his life. In 1902 he returned to the Westinghouse company in an engineering capacity and remained with the company until 1909, when he became connected with the Lincoln Electric Co., Cleveland, remaining with that company until a few days ago, when he took up his new duties at Cornell. From 1911 to 1915 Mr. Lincoln was head of the electrical school of the University of Pittsburgh, while still carrying on his work with the Westinghouse Electric & Mfg. Co. He was for many years active in the affairs of the American Institute of Electrical Engineers, of which he was president in 1914 and 1915. He has also been an active worker for the interests of his alma mater, and is a past president of the Ohio State University Association, a national organization.

PAUL M. LINCOLN

Frederick G. Hughes, vice-president New Departure Mfg. Co., Bristol, Conn., has been elected president of the Bristol Chamber of Commerce.

A. Skidmore, for many years with the Ayer-O'Connell Mfg. Co., Meriden, Conn., has been chosen superintendent of the new plant at Bridgeport, Conn., of the recently organized Manufacturers' Polishing & Platers' Supply Co.

M. W. Hall, chief mechanical engineer, South Side works, Jones & Laughlin Steel Co., Pittsburgh, has resigned and has been succeeded by C. G. Bigelow, formerly with the American Sheet & Tin Plate Co.

Stephen Badlam has been appointed works manager of the Superior Steel Corporation, Pittsburgh, the plant of which is at Carnegie, Pa., succeeding James Warren, who resigned recently to become works manager of the LaLance & Grosjean Mfg. Co., Woodhaven, L. I. For the past year Mr. Badlam has been engaged as an engineer, specializing in rolling mill equipment in Philadelphia, but previously for 12 years has been in the operating department of the Pennsylvania Steel Co.; served as assistant chief engineer, Pittsburgh Crucible Steel Co., during the building of its plant at Midland, Pa., and later was chief engineer, Pittsburgh Seamless Tube Co., Beaver Falls, Pa. In the World War he was major of infantry on the General Staff, First Army, and was overseas for two years. Following the war he was sales engineer with the Philadelphia Roll & Machine Co. He is a graduate of the Massachusetts Institute of Technology.

R. L. Beers, recently appointed chief engineer of the Detroit Stoker Co., was graduated from Syracuse University in mechanical engineering, with the class of 1912. Four years ago he was appointed testing engineer of the Underfeed Stoker Co. of America and was later promoted to the position of assistant chief engineer.

C. A. Crusoe, who has been director of purchases of the Fisher Body Co., Cleveland, has been transferred to Detroit, where he has become supervisor of purchases for the General Motors Division of the company. His office is in the General Motors Building.

Edward C. Wilson, formerly connected with the U. S. Light & Heat Corporation and the Vapor Car Heating Co., with offices at Chicago, has been appointed western sales manager of the Ohio Locomotive Crane Co., Bucyrus, Ohio, with offices in the Railway Exchange Building, Chicago.

J. J. Eichenberger, who has been freight agent Pennsylvania Railroad, with headquarters at the Allegheny freight terminal, Pittsburgh, N. S., has resigned that position to become traffic manager of the Pittsburgh Crucible Co., Pittsburgh.

Allan Fraser, New York, resigned Nov. 1 as general sales manager of the Wickwire-Spencer Steel Corporation and will leave shortly for San Francisco, where he will be sales representative for that corporation on the Pacific Coast. Arrangements have been completed which will permit him to establish selling connections with other representative manufacturers of iron and steel products, hardware and kindred lines. Mr. Fraser will have a sales force and warehouse facilities, both in San Francisco and Los Angeles. For 25 years he was identified with the American Steel & Wire Co. and developed its extensive business in the territories under his supervision. He received his training in the office of James A. Farrell, now president of the United States Steel Corporation, and through years of work for the American Steel & Wire Co., the Wickwire Steel Co. and its successor, the Wickwire-Spencer Steel Corporation. On a recent trip across the continent Mr. Fraser made an exhaustive study of trade conditions and requirements west of the Rockies.

ALLAN FRASER

Harry W. Coffin, vice-president and general manager Alabama Co., Birmingham, Ala., retired effective Nov. 15. John W. Porter, vice-president and sales manager, who has been with the Alabama Co. for 14 years, will assume Mr. Coffin's duties in addition to his own.

R. W. Valls, vice-president and consulting engineer, Champion Engineering Co., Kenton, Ohio, which he was instrumental in organizing from the old Champion Iron Co., has resigned.

Fred C. Severin, for many years with the Niles-Bement-Pond Co., and more recently with the Betts Machine Co., Rochester, N. Y., now a part of the Consolidated Machine Tool Corporation, and B. H. Tripp, for many years with the Chicago Pneumatic Tool Co., have formed a partnership for the purpose of buying and selling used machine tools. They have taken an office at 25 Church Street, New York.

Burton E. Carpenter has been appointed sales representative of the Garvin Machine Co., New York, in the territory embracing eastern Pennsylvania, Maryland, Delaware and southern New Jersey.

N. J. Higinbotham has resigned as New York district sales manager of the Wheeling Steel Products Co. to become president of the Fred Adee Corporation, 5 Cliff Street, New York, an old plumbing and steam supply house. He is succeeded by Charles E. Scofield,

who has been connected with the Wheeling Steel Corporation for about 20 years. Percy W. Abbott, district sales manager, Wheeling Corrugated Co., succeeds Mr. Scofield.

P. E. Miller, for 13 years manager of the Bryden Horse Shoe Works, Catasauqua, Pa., has resigned to accept a position with the Tredegar Iron Co., Richmond, Va.

Stanley B. Wentz, formerly with the Lindsay Chaplet & Mfg. Co., has resigned to become general manager of the Pennsylvania Foundry Supply Co., Liberty Building, Philadelphia.

Fay Ingalls, secretary Niles-Bement-Pond Co., 111 Broadway, New York, has resigned, due to the pressure of personal affairs since the death of his brother. He has been succeeded by C. S. Guthrie, formerly of the Pond Works.

William F. Anklan, who has been elected president of the Hall Lamp Co., Detroit and Kenosha, Wis., began service 20 years ago as a bookkeeper in the general offices of the Badger Brass Mfg. Co., Kenosha. When the industry became a part of the Hall Lamp Co., Mr. Anklan was transferred to the general offices in Detroit as office manager. Shortly afterward he was elected secretary-treasurer and made assistant to President J. F. Hartz, whom he now succeeds upon the elevation of Mr. Hartz to the chairmanship of the board.

James R. Anderson, assistant general manager of the Kenosha, Wis., branch of the American Brass Co., division of the Anaconda Copper Co., has tendered his resignation, effective Jan. 1.

Robert Liston, who has been in the sales department of the Inland Steel Co., Chicago, since 1914, has been transferred to the company's St. Louis office as assistant to Frank R. Meyer, Jr., district sales manager. Mr. Liston was with the Griffin Wheel Co., Kansas City, before going with Inland Steel Co. The territory covered by the St. Louis office includes southern Missouri, southern Illinois, southern Indiana, northern Louisiana and all of Kentucky, Tennessee, Arkansas and Oklahoma.

W. W. Heylmun, formerly chief chemist of the St. Louis Coke & Chemical Co., Granite City., Ill., has been made blast furnace superintendent succeeding T. W. Harris, who resigned recently to become connected with the Tata Iron & Steel Co. in India.

Joseph G. Shryock, designing engineer, Belmont Iron Works, Philadelphia, has been appointed chief engineer of that company. After being graduated in civil engineering from Pennsylvania Military College in 1900, he became associated with the bridge and construction department of the Pencoyd plant, American Bridge Co. In 1903 he accepted a position in the engineering department of the Virginia Bridge & Iron Works, Roanoke, Va., remaining there until 1904, when he returned to Philadelphia to become connected with the Belmont Iron Works. Two years later he was appointed designing engineer, which position he held until his recent change.

R. Klinkenburg, of the executive committee of the Union Dortmund works in Germany; F. Burgers, blast furnace superintendent at Gelsenkirchen, Westphalia; G. Knepper and H. Olfe, mining engineers; W. Martini, chief engineer at Union Dortmund, and G. Opderbeck, chief engineer at Gelsenkirchen, compose a party of representatives of Stinnes iron and steel interests who are visiting various iron and steel and coke oven plants in the United States. From Granite City, Ill., where they visited the coke oven and blast furnace plants of the St. Louis Coke & Chemical Co. the party left last week for Birmingham, Ala.

Harry J. Cogswell, formerly associated with the Ajax Forge Co., Chicago, has recently joined the organization of the Valley Forge Steel & Tool Co., Chicago, as general sales manager.

Reorganization plans having failed, the property of the Union Motor Truck Co., Bay City, Mich., will be sold at bankruptcy sale Dec. 12.

OBITUARY

WALTER M. SPAULDING, Worcester, Mass., chairman of the Graton & Knight Mfg. Co., and for many years president and managing head of the business, died in Worcester, on Nov. 16, aged 76 years. In 1869 he entered the employ of Graton & Knight, manufacturers of leather belting, and in 1872 was made a director and secretary. He was general manager when in 1909, on the death of Joseph A. Knight, he was elected president. Within the past year he retired from the presidency because of ill health.

FREDERICK W. GARDNER, chairman of the board of directors, Bucks Stove & Range Co., St. Louis, died at Beverley Hills, Cal., on Nov. 11. Mr. Gardner was at one time manager of the Western branch for the Michigan Stove Co., Detroit.

C. HENRY HUTCHINS, for many years president of Crompton & Knowles Loom Works, Worcester, Mass., died at his home in Shrewsbury, Mass., on Nov. 14, aged 75 years. He entered upon a manufacturing career as a young man, first for himself, then with L. J. Knowles & Bros., loom builders. On the death of Francis B. Knowles he became president, and continued as such in the larger business which came with the consolidation with the Crompton Loom Works. Mr. Hutchins retired from business in 1917. He was president of the United States Envelope Co. from the time of its organization.

FRANK W. BUFFUM, president, Buffum Tool Co., Louisiana, Mo., died recently in St. John's Hospital, St. Louis, from pneumonia. He was 63 years old. Mr. Buffum formerly was president of the Buffum Telephone Co. and for four years was Highway Commissioner of Missouri, serving under Governor Major. His father, the late Col. G. A. Buffum, founded the LaCrosse Lumber Co. of Louisiana. A brother, Col. Charles G. Buffum, is president of that company and of the Bank of Louisiana.

HENRY HIRSCH, 57, vice-president, American Cutlery Co., 111 Fifth Avenue, New York, died suddenly last Wednesday morning at the Hotel Claridge. Mr. Hirsch had been in apparent good health up to the time of his death which was attributed to heart failure.

GEORGE F. SMITH, Southington, Conn, died at his home there on Sunday evening, Nov. 12, in his 92nd year. Mr. Smith was at one time vice-president of H. D. Smith & Co., Plantsville, Conn., manufacturers of forgings, but for the past 20 years had led a retired life.

RAYMOND H. STILES, assistant manager, Jenkins Brothers, Boston, manufacturers of valves, died at his home in Wollaston, Mass., on Nov. 12, following an illness of three months. Mr. Stiles was born in Brockton, Mass., about 40 years ago and became associated with the Jenkins company at the age of 20.

JOHN DOWLING, veteran furnace manager, died at Oakland, Cal., last week, aged 70 years. He had been furnace manager for many years with the Tennessee Co., Bessemer, Ala., and for the past 10 years had been furnace manager with the Chattanooga Iron & Coal Co. One of his sons, John Dowling, Jr., is furnace manager for the Gulf States Steel Co., Alabama City. Mr. Dowling had gone west on account of impaired health.

The manufacture and sale of the Loy & Nawrath line of power brakes, shears and kindred products has been taken over by the Birmingham Iron Foundry, Derby, Conn. This business, formerly conducted by the Loy & Nawrath Co. of Newark, N. J., will be handled by the Loy & Nawrath Division of the Birmingham Iron Foundry and all correspondence and business will be centered at the Derby office. Increased facilities are provided by the new arrangement.

Machinery Markets and News of the Works

BUSINESS TAPERING OFF

Orders for Machine Tools Show a Decline in Some Markets

Disposition of Certain Prospective Buyers to Postpone Purchases Is Noted

Excepting Cleveland and Detroit, which continue to enjoy a fairly satisfactory machine-tool trade, due largely to purchases by the automobile industry, the past week has shown a tapering off in orders in some of the leading selling centers. There is noted a disposition on the part of many buyers to postpone purchases, probably until the new year.

Among the principal buyers in the automotive field are the Electric Auto Lite Corporation, Toledo, Ohio, which has purchased 13 machines, and the Nash Motors Co., Kenosha, Wis., and the Rickenbacker Motor Co., Detroit, which have each purchased a half dozen turret lathes.

The month has brought considerable improvement in the demand for automatic screw machines and turret lathes.

Chicago reports a cessation in railroad buying, and also that while inquiries are fairly numerous, there has been a decline in orders booked. Pittsburgh likewise reports lessened activity, with indications of postponement of many purchases until the new year. The transportation congestion and the resultant accumulation of steel at steel mills have a tendency to prevent steel companies from buying new equipment of any kind.

The Pennsylvania Railroad has begun placing orders against its recent list which numbered about 80 tools.

In the East there is little change. Demand continues at a fair rate, but buyers are interested principally in used tools. One large machinery house reports that the bulk of its sales is in used tools. The American Locomotive Co. has purchased seven or eight tools for its plant at Richmond, Va., and is expected to issue a list soon for its Schenectady works. The New York Central has bought a radial drill and two lathes; the Norfolk & Western two right line radial drills, and the Southern Pacific an axle lathe. The Spicer Mfg. Corporation, South Plainfield, N. J., has bought a few tools.

The H. H. Franklin Co., Syracuse, N. Y., has informed some in the machine-tool trade that it has postponed construction of a new factory for manufacture of four-cylinder cars.

The Cleveland Board of Education has taken bids on about 20 metal and woodworking tools.

New York

NEW YORK, Nov. 21.

DEMAND for used tools is keeping up at a fairly good rate, but new tools are lagging behind. Some dealers who handle used tools as well as new lines are doing almost a normal business, as compared with pre-war records, but the bulk of their orders is for second-hand machines. There are very few inquiries and a good deal of the current business must be developed as there is very little spontaneous demand. The American Locomotive Co. has purchased seven or eight tools for its Richmond, Va., plant and is expected to issue a list shortly for its Schenectady works. The Spicer Mfg. Corporation, South Plainfield, N. J., has bought a few tools. Other purchases include a radial drill and two lathes by the New York Central Railroad; two 8-ft. right line radial drills by the Norfolk & Western; an axle lathe by the Southern Pacific, and six 600-lb. steam hammers to a coal company.

Few new inquiries in either overhead or locomotive cranes are in evidence. Sales of hand power cranes are also slack. Construction of new shops by the Board of Trustees of the Boston Elevated Railroad, 108 Massachusetts Avenue, Boston, may result shortly in inquiry for cranes. Although the Pennsylvania Railroad, Eastern Region, Philadelphia, has not yet closed for the two 12½-ton electric cranes inquired for a short time ago, a new inquiry has been issued calling for prices on a 3-ton, 33-ft. span, 4-motor, overhead traveling crane, also for Altoona, and the railroad is understood to also be in the market for a 7½-ton electric crane.

Among recent sales are:

Anaconda Copper Mining Co., 25 Broadway, New York, two 10-ton, 45-ft. 1-in. and 50-ft. 3-in. spans electric cranes from the Shaw Electric Crane Co., for Anaconda, Mont.

New York, New Haven & Hartford Railroad, a 10-ton, monorail hoist from the Shepard Electric Crane & Hoist Co.

United Fruit Co., 17 Battery Place, New York, two 3-ton, 3-motor electric cranes from the Niles-Bement-Pond Co.

Ben Hur Erection Co., a 25-ton locomotive crane to be equipped with 65-ft. boom, for use in St. Louis, from the Industrial Works.

Louisville & Nashville Railroad, Louisville, Ky., a No. 3 pile driver from the Industrial Works.

Southern Pacific Co., 165 Broadway, New York, a 40-ton, 70-ft. boom, locomotive crane for use in California, from the Industrial Works.

The Boston & Maine Railroad, Boston, is reported to have purchased three locomotive cranes from the Browning Co.

Bartlett Hayward Co., Baltimore, Md., has purchased five electric traveling cranes for its foundry from the Chesapeake Iron Works.

Thomson Machine Co., Belleville, N. J., has purchased a small hand power crane from an unnamed builder.

The Empire Tinware Co., 33 South Fifth Street, Brooklyn, is taking bids for a four-story addition, 100 x125 ft., estimated to cost $35,000. Improvements will also be made in the present factory. William I. Hohauser, 116 West Thirty-ninth Street, New York, is architect and engineer.

The British-American Metals Co., Inc., 200 Broadway, New York, has awarded contract to the Levering & Garrigues Co., 552 West Twenty-third Street, for a one-story brick and steel addition to its plant on South Second Street, Plainfield, N. J., 40 x 150 ft., to cost $25,000. N. A. Staples is vice-president in charge.

Edward M. Adelsohn, 1778 Pitkin Avenue, Brooklyn, architect, has plans under way for a two-story automobile service and repair building, 130 x 190 ft., on Kingston Avenue, estimated to cost $200,000. The owner's name will be announced at an early date.

The National Biscuit Co., 85 Ninth Avenue, New York, has plans nearing completion for a three-story automobile repair and service building at 407 West Sixteenth Street, estimated to cost $70,000. J. R. Terrance, company address, is architect and engineer.

The Callahan Zinc-Lead Co., 61 Broadway, New York, has preliminary plans for extensions in the plant of its subsidiary, the Galena Mining Co., operating in the Coeur

d'Alene district, Idaho, to include new milling machinery and other mechanical equipment.

The Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y., has plans under way for an addition. George Mertz, company address, is engineer.

Power equipment, ice and refrigerating machinery, conveying apparatus, etc., will be installed in the new three-story plant, 145 x 200 ft., to be erected at 9-19 West 141st Street, New York, by the Reid Ice Cream Co., 524 Waverly Avenue, estimated to cost approximately $250,000, with machinery.

Olney & Warrin, 295 Lafayette Street, New York, machinery, have inquiries out for a 14 x 30 steam engine, Corliss type.

The C. Dentermann & Son Ice Co., White Plains, N. Y., has plans in progress for a one-story addition to its plant, 50 x 120 ft., estimated to cost $65,000. Louis Block, 501 Fifth Avenue, New York, is consulting engineer. Leroy Rader is superintendent.

Motors, controllers, power equipment and other mechanical apparatus will be installed in the new five-story printing plant to be erected by the Edward Langer Printing Co., Inc., Jamaica, L. I. To provide for the expansion, the company has arranged for a bond issue of $1,350,000.

The Bureau of Yards and Docks, Navy Department, Washington, will readvertise for bids for the proposed veterans' hospital and mechanical buildings at Tupper Lake, N. Y., for which revised plans are in preparation. Part IV of the specifications calls for electric equipment, including transformers, panel boards, fixtures, conduits, ducts and wiring; and Part V, return tubular boilers, feed-water heater, steel storage tank, feed-water and vacuum pumps, combined twin pump and receiver, and other mechanical equipment. Drawings and specifications will be available before the close of the month.

The Huntoon Ice Co., 631 Hudson Street, New York, has purchased property, 92 x 100 ft., on West Nineteenth Street, near Tenth Avenue, as a site for a new ice-manufacturing plant.

The Sewer and Water Board, Saranac Lake, N. Y., will receive bids until Nov. 27 for two 3,000,000-gal. horizontal double-acting duplex plunger type pumps, with chain drive equipment for each pump. John L. Collins is consulting engineer for the board.

A manual training department will be installed in the two-story and basement high school, 100 x 105 ft., with wing, 54 x 105 ft., to be erected at Ocean City, N. J., estimated to cost $250,000. Plans are being prepared by V. B. Smith, Guarantee Trust Building, Atlantic City, architect.

The Lime & Stone Products Co., Hamburg, N. J., will electrify its properties in this district, and will install motors and other equipment. Power will be furnished by the New Jersey Power & Light Co., Dover.

The Water Board, Burlington, N. J., will install additional pumping machinery at the municipal waterworks. G. A. Allison, Burlington, is engineer.

Jay Hayes and Victor Preston, officials of the Hayes-Ionia Co., Grand Rapids, Mich., manufacturer of automobile bodies, are organizing a company to occupy a portion of the plant of the Durant Motor Car Co., Elizabeth, N. J., for the manufacture of bodies for Durant automobiles. It will be operated as a separate company, apart from the Hayes-Ionia organization.

A vocational department will be installed in the proposed new Central high school to be erected at South Orange, N. J., under joint agreement by town and township officials, for which a fund of about $500,000 will be provided.

The Public Service Electric Co., Public Service Terminal, Newark, has received permission to issue stock for $2,250,000, the proceeds to be used for extensions and equipment.

Plans are under way for the construction of a new ice and refrigerating plant at South River, N. J., 50 x 400 ft., estimated to cost close to $70,000. M. Hammerschlag, secretary of the local Chamber of Commerce, represents the owner.

The American Welding Co., Carbondale, Pa., plans to build near New York, in the spring of 1923, a brass foundry, an iron foundry and a machine shop, for the manufacture on a quantity basis of a new heavy tractor. L. A. Belding, 30 Church Street, New York, has charge of the work.

The Hart & Hegeman Co., Hartford, Conn., manufacturer of junction boxes, clamps, etc., has purchased the plant of the Hartford Auto Parts Co. at Hartford, the consideration being $200,000. The Hartford Auto Parts Co. will continue to occupy a part of the premises as a tenant. On Nov. 23 the Hartford Auto Parts Co. will sell at auction a large part of its machine-tool equipment, but will withhold from sale about 350 tools of various types.

New England

BOSTON, Nov. 20.

THE volume of machine tool business the past week showed healthy expansion, with more individual firms participating. Used machinery, however, holds the center of the stage, sales of new equipment having dropped to small proportions, although the purchase of 16 new ring turning lathes to a Massachusetts textile machinery maker is noteworthy. Aside from this sale, and an inquiry for three to six high speed drills from a local boiler maker, an advance of 10 per cent on a New England make of lathes and of about 5 per cent on miscellaneous small machinery by a Hartford manufacturer, the new tool market presents little interest.

On the other hand, a Massachusetts manufacturer has purchased more than a dozen used and some new individual tools, as well as jigs and fixtures, with more to follow; eight semi-automatic Pratt & Whitney machines and an 8-in. Heald rotary grinder with magnetic chuck went to a Rhode Island manufacturer; a grinder, two lathes, two drills, screw machine and a milling machine to another Rhode Island interest; a No. 1½B milling machine to a Massachusetts textile machinery maker; a new 24-in. x 8-ft. South Bend lathe and a used No. 2 Kempsmith milling machine to a South Boston firm; a 24-in. planer to a Nashua, N. H., concern; a 4-ft. radial drill to a Boston house; a 2¼-in. Gridley automatic, four manufacturing type Cincinnati millers, V & O presses and miscellaneous shop and production equipment to users in practically every New England State.

The Stanley Works, New Britain, Conn., hardware, which recently added to its holdings by acquiring property from the W. L. Damo Coal Co., has purchased from the New Britain Machine Co. property at 77 to 87 Elm Street, which will be developed for the manufacture of rules and levels.

Fire last week did considerable damage to various units of the Hunt-Spiller Mfg. Corporation, South Boston, gun castings. The greatest damage was sustained in the pattern storage unit.

James Macnaughtan is president and Andrew Hogdon treasurer of the Gordon Machine Co., 40 State Street, Boston, recently incorporated under Massachusetts laws with a capital of $300,000 to manufacture machinery for packing either free flowing material or single objects into small cartons or paper bags.

The Lander Welding Co., 41 Chester Street, Malden, Mass., will erect a one-story, 40 x 50 ft. manufacturing building.

Fire last week destroyed the car and repair shops of the Bangor & Aroostook Railroad, Houlton, Me., at an estimated loss of $100,000. The company will rebuild.

A manual training department will be included in the new $205,000 high school to be erected by the town of Fairfield, Conn., bonds for which were voted this week. O. C. S. Ziroli, 211 State Street, Bridgeport, is the architect.

The Connecticut Brass Co., Waterbury, Conn., has plans prepared for a new castings factory on Watertown Avenue.

The Holmes Special Tool Co., 38 Canal Street, New Haven, Conn., has awarded contract for a one-story 40 x 65-ft. brick and steel addition.

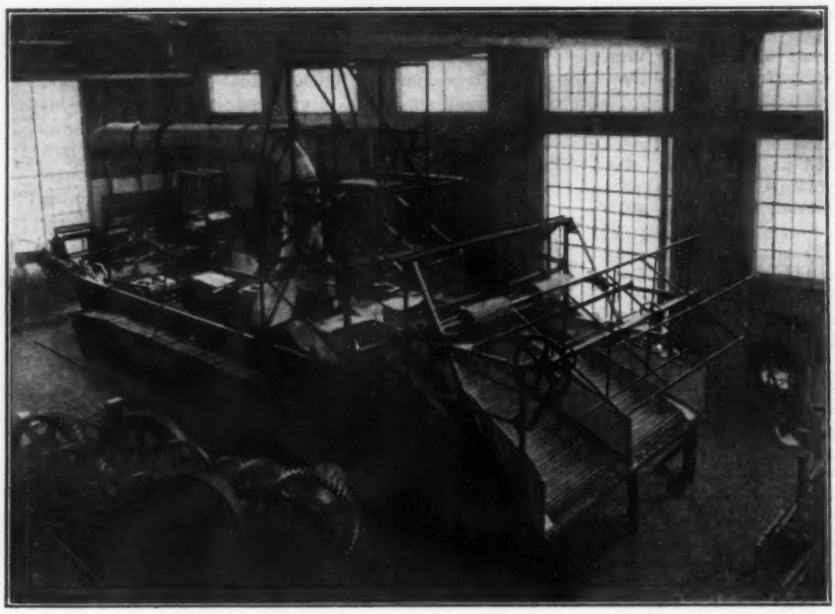
The Locomobile Co. of America, Inc., Bridgeport, Conn., has awarded contract to the Levering & Garrigues Co., New York, for a one-story 60 x 180-ft. addition to its machine shop and a one-story 40 x 200-ft. brick and steel building, besides alterations to buildings. Lockwood, Greene & Co., 101 Park Avenue, New York, are the engineers.

The Kinney Mfg. Co., 3541 Washington Street, Boston, manufacturer of pumps, compressors, etc., will build a one-story addition as a testing department.

The Parks & Woolson Machine Co., Springfield, Vt., has work under way on a new three-story and basement, brick and reinforced concrete plant, 40 x 70 ft.

The New England Steel Casting Co., 100 School Street, Springfield, Mass., will hold in abeyance the rebuilding of its one-story foundry at East Longmeadow, Mass., destroyed by fire some time ago. The structure, as designed, will be 70 x 125 ft., estimated to cost $50,000. Morris W. Maloney, 145 Chestnut Street, Springfield, is architect.

The Liberty Marble Co., 80 Granite Street, South Boston, has completed plans for a new one and two-story grinding, finishing and polishing works, 80 x 122 ft., at 42 Dillingham Street, Dorchester, Mass., to cost $30,000.



THIS land and sea boat, propelled by a pair of stern paddle wheels when it is afloat and by a pair of caterpillars or apron wheels when it is in shallow water near the shore, was built by the Norbom Engineering Co., Darby, Pa., for the Grass Fibre Pulp & Paper Corporation, Leesburg, Fla., for harvesting saw grass for use in the manufacture of paper pulp. The machine reaps the grass, cuts it into approximately 3-in. lengths inside the boat and then blows it through an overhead delivery pipe into a cargo carrier. It is built to deliver 30 to 40 tons of grass per hour. The body of the machine is a flat bottom boat, 45 ft. long, 10 ft. wide and 5 ft. high. The extreme length is 60 ft. 8 in. The machinery is driven by a Wisconsin gasoline motor, while for propulsion a Continental motor is used.

The New Haven Sherardizing Co., Hartford, Conn., has leased property at 917 Sweitzer Street, Akron, Ohio, for its proposed plant, totaling about 9000 sq. ft. of floor space. The local plant will be removed to the new location and it is expected to commence production early in Jan.

The S. Lowe & Sons Co., Fairfield, Conn., manufacturer of builders' hardware, etc., has awarded contract to Thomas Lanese, 198 Calhoun Street, Bridgeport, Conn., for a two-story addition, 45 x 80 ft.

The City Council, Springfield, Mass., has preliminary plans under way for a new technical high school, with vocational departments, adjoining a present school on State Street, estimated to cost approximately $800,000. E. C. and G. C. Gardner, 33 Lyman Street, are architects.

The Gloucester Electric Co., Gloucester, Mass., will issue additional capital stock for $102,620, a portion of the proceeds to be used for extensions and improvements.

The William H. Field Co., 39 Washington Street, North, Boston, woodworking machinery, has construction in progress on a one-story building, 60 x 250 ft., on Dorchester Avenue, South Boston.

The Connecticut Co., Church Street, New Haven, Conn., operating electric power utilities, is considering the construction of an addition to its power plant to cost $150,000.

Handschumacher & Co., 25 John Street, Boston, meat packers, are arranging for the installation of a cold storage and refrigerating plant in their new factory at 16 North Street.

The Phillips Insulated Wire Co., Pawtucket, R. I., will build a new one-story power house, 28 x 65 ft., estimated to cost $30,000.

The Crompton & Knowles Loom Works, Inc., Worcester, Mass., has awarded contract for a one-story addition to its Providence plant, 50 x 170 ft., with basement. The main floor will be equipped as an erection shop.

The Texas Co., 17 Battery Place, New York, is reported to have purchased the shipyard of the Emergency Fleet Corporation at Bath, Me., and will use the site for storage and distributing works.

The Common Council, Warren, Mass., is planning for the installation of new pumping machinery, in connection with extensions and improvements in the municipal waterworks.

The Warren & Irrgang Co., 238 Dwight Street, Springfield, Mass., manufacturer of factory trucks, trailers, etc., has acquired a building at Chicopee, Mass., where it will remove its works for increased production.

Philadelphia

PHILADELPHIA, Nov. 20.

CONTRACT has been awarded to the Pittsburgh-Des Moines Steel Co., 50 Church Street, New York, by the Abrasive Co., Tacony and Freley Streets, Philadelphia, for a one-story addition.

The Pennsylvania Sugar Co., Delaware Avenue, Philadelphia, has plans in preparation for a new group of buildings at its local refinery.

The Foreign Trade Bureau of the Philadelphia Commercial Museum, Thirty-fourth Street, has received an inquiry from a company at Caracas, Venezuela, for machinery for manufacturing pressed metal ceilings, moldings, tiles, etc., also for equipment for the production of paperboard and composition materials. An inquiry has also been received from Winterthur, Switzerland, requesting information on American manufacturers of air compressors and ice-making machinery. Full information available upon request.

The American Insulation Co., Roberts and Stokley Streets, Philadelphia, manufacturer of asbestos products, has awarded contract to the William Steele & Sons Co., 1600 Arch Street, for a new building to cost $25,000.

The General Paper Products Co., 3430 Lancaster Avenue, Philadelphia, manufacturer of paper and metal containers, plans for the installation of new metal-working equipment and paper container machinery, dies, etc.

The Pennsylvania Independent Oil Co., Inc., Philadelphia, care of J. H. Sherman & Co., Bulletin Building, is disposing of capital stock amounting to $440,000, the proceeds to be used for extensions and improvements in plants and system. James P. Culbertson is president.

F. H. Caven, director of Public Works, City Hall, Philadelphia, will receive bids until Nov. 29 for air lifts and other equipment to be installed in the Northeast sewerage treatment plant, estimated to cost $50,000. C. A. Allen, City Hall, is engineer. The Bureau of Water, C. E. Davis in charge, has inquiries out for one 500-hp. uniflow engine, to operate under a steam pressure of 170 lb.

The Frank H. Stewart Electric Co., 37 North Seventh Street, Philadelphia, electrical equipment, has work under way on a four-story and basement addition to its six-story works.

The Buick Motor Co., Flint, Mich., a division of the General Motors Corporation, is in negotiation with the Chamber of Commerce, Trenton, Secretary Lochner, relative to the establishment of a factory branch. Several sites are being considered.

The City Council, Gloucester City, N. J., has approved of a bond issue of $80,000, to be used in connection with the equipment installation at the new municipal pumping plant, the total cost of which will aggregate $260,000.

The Littlefield Ice & Coal Co., Hammonton, N. J., will commence the erection of a new ice-manufacturing and cold storage plant to cost $55,000.

The City School Board, West King Street, York, Pa., will soon call for bids for a three-story and basement industrial high school, 230 x 245 ft. Plans are being completed by Hamme & Witman, City Bank Building.

The East Penn Electric Co., Pottsville, Pa., has arranged for a preferred stock issue of $1,110,000, a portion of the proceeds to be used for power plant extension, etc. Work has been commenced on a new generating plant with initial capacity of 33,000 hp., and designed for an ultimate output of 330,000 hp. C. A. Hall is president.

The Livingood Mfg. Corporation, Lebanon, Pa., has leased the local Laudermilch Building for the establishment of a new plant to manufacture collapsible stoves, metal camping equipment, etc.

The Scranton Lace Co., Glenn Street, Scranton, Pa., is planning for the erection of a new power house at its textile mill to cost about $65,000.

Fire, Nov. 11, destroyed a portion of the plant of the Standard Wire Co., New Castle, Pa., with loss estimated at $35,000. It is planned to rebuild.

The Confederated Home Abbatoirs Co., Bethlehem, Pa., has been formed under State laws to construct and operate a packing plant, refrigerating and cold storage plant on site recently acquired. Plans have been drawn. Victor B. Boyer, 242 North Eleventh Street, Allentown, Pa., is treasurer in charge.

Bids have been rejected for the erection of the proposed high school at Bridgeport, Pa., and revised plans will be drawn. New bids will be asked after Jan. 1. A vocational department will be installed. The Building Committee of the Bridgeport School Board is in charge.

The Monessen Foundry & Machine Co., Monessen, Pa., has tentative plans for rebuilding the portion of its plant recently destroyed by fire, with loss estimated at $200,000, with machinery.

Motors, controllers, power and other equipment will be installed in the three-story printing plant, 80 x 100 ft., to be erected at Slatington, Pa. It will cost about $50,000, exclusive of machinery, which is esimated at $150,000. John A. Brush, Slatington, is in charge, and will be head of the operating company.

The Nanticoke Garage Co., Nanticoke, Pa., will soon take bids for a three-story service and repair building, 50 x 100 ft., witht wing extension, to cost $65,000. G. T. Price, Miller Building, Scranton, Pa., is architect.

The Kurtz Brothers Furniture Co., Bethlehem, Pa., manufacturer of hotel and school equipment, has plans under consideration for rebuilding its plant at Avenue B and West Union Street, destroyed by fire Nov. 15 with loss estimated at $750,000, including machinery. John, Charles and Herman Kurtz head the company.

The Watsontown Door & Sash Co., Watsontown, Pa., has tentative plans under consideration for a new generating plant for factory and municipal service to cost $300,000, including machinery.

Fire, Nov. 14, destroyed a portion of the plant of the Fuller-Lehigh Co., Fullerton, Pa., manufacturer of machinery, iron and steel castings, etc., with loss estimated at $30,000. It is planned to rebuild.

The Jointless Fire Brick Co., 1130 Clay Street, Chicago, has preliminary plans in progress for a new fire brick and refractory plant on New York Avenue, Trenton, N. J., one-story, 70 x 250 ft., to cost approximately $75,000.

The Hummel Steel Foundry Co., Pottstown, Pa., has been formed under State laws to operate a plant for the manufacture of steel and semi-steel castings. A building has been acquired and operations will commence at an early date. George W. Corbett, 63 High Street, is treasurer.

Baltimore

BALTIMORE, Nov. 20.

THE American Oil Co., American Building, Baltimore, has taken over the shipyard of the Henry Smith Shipbuilding Co., Curtis Bay, for about $90,000. Plans are in progress for a new oil storage and distributing plant, with barrel and box factory, pumping plant and power house, estimated to cost approximately $500,000, including a concrete pier. Louis Blaustein is president.

The Bureau of Supplies and Accounts, Navy Department, Washington, will receive bids until Dec. 12 for 20 portable electric drills and nine electric grinders, for the Mare Island Navy Yard, San Francisco, schedule 295; until Dec. 5, for miscellaneous rubber pump valves, schedule 299.

Pihl & Miller, Wabash Building, Pittsburgh, contractors, have received contract for a new plant at Ridgeway, W. Va., to manufacture automobiles, and will break ground for the initial unit before the close of the month. The plant is estimated to cost in excess of $1,000,000, including machinery. A site of more than 2000 acres has been acquired and a company, capitalized at $10,000,000, is being organized to build and operate the plant. The names of the principals and details of the project are temporarily withheld.

D. C. Elphinstone, 408 Continental Building, Baltimore, machinery dealer, is inquiring for a 15-ton electric bridge crane, 50-ft. span; also for two 2½-yd. clam shell buckets.

The Chief of Engineers, United States Army, Munitions Building, Washington, will take bids until Dec. 6 for one steam locomotive crane, 36-in. gage, as per specifications on file, advertisement No. 95.

An electric power plant, steam-operated, ice-manufacturing plant with daily capacity of 225 tons, and five-story cold storage and refrigerating plant, will be constructed by the White Provision Co., Atlanta, Ga., in connection with a new packing plant on the Howell Mill Road. It is estimated to cost $350,000 with equipment. W. H. White is president.

The Tide Water Power Co., Wilmington, N. C., operating electric light and power properties in this section and at St. Petersburg and Clearwater, Fla., has arranged for a bond issue of $3,000,000, a portion of the proceeds to be used for extensions and improvements.

The Carter Production Works, 210 South Water Street, Wilmington, N. C., machinery dealer, is making inquiries for a wheel press, about 76-in. diameter, 250 to 300 tons.

The City Council, Elizabeth City, N. C., has arranged a bond issue of $550,000 for the installation of a municipal electric light and power plant and extensions in the waterworks.

Harry Evans, St. Michaels, Md., is planning for the erection of a one-story machine ship, to replace his works recently destroyed by fire.

The Standard Ice & Fuel Co., Charlotte, N. C., will commence the erection of an addition to its ice-manufacturing plant, with capacity of about 40 tons per day. All equipment will be electrically operated.

The Chief of Air Service, United States Army, Washington, will receive bids until Dec. 1 for one automatic motor-driven air compressor; until Nov. 27 for 25 single-pole, single-throw toggle switches, 25 navigation light signal switches and 100 flare push-button switches; and until Nov. 28 for 100 wind cones, 24-in.

The Atlantic Ice & Coal Corporation, Pratt Street, Atlanta, Ga., has awarded contract to the Barge-Thompson Construction Co., Atlanta, for a two-story service and repair building for company trucks, estimated to cost $50,000.

The Newport News & Hampton Railway, Gas & Electric Co., Newport News, Va., has arranged for a common stock issue, to net in excess of $100,000, a portion of the proceeds to be used for extensions. J. N. Shannahan is president.

The Wheeling Corrugating Co., Wheeling, W. Va., a subsidiary of the Whitaker-Glessner Co., is said to be planning for an addition to its plant at Richmond, Va.

The Westinghouse Electric & Mfg. Co., Pittsburgh, has leased a five-story building, 100 x 150 ft., to be erected at Jones Avenue and Marietta Street, Atlanta, Ga., by the Massell Realty Co., estimated to cost $300,000, for a new factory branch for Southern territory.

The Dorchester Fertilizer & Lime Co., Cambridge, Md., is planning for the installation of a complete grinding mill and auxiliary equipment, with capacity of about 60 tons per day. Lloyd Webster is president.

The Street Cleaning Department, Baltimore, has received an appropriation from the Board of Estimate for the coming fiscal year of $10,000 for supplies and repairs to motor trucks, and $10,000 for supplies and repairs to horse-drawn trucks and carts; also $25,000 for the purchase of additional motor trucks. Edward P. Callahan is deputy commissioner of street cleaning.

A manual training department will be installed in the two-story and basement high school to be erected at Concord, N. C., estimated to cost $150,000. C. G. Sayre, Anderson, S. C., is architect.

Following the rejection of a proposal for light and power service from the Potomac Public Service Co., the Board of Street Commissioners, Hagerstown, Md., has authorized preparation of plans for the proposed municipal electric power plant, estimated to cost $300,000.

The Wilson-Hock Co., City Point, Va., machinery dealer, has inquiries out for 30 to 35 hp. motors, equipped with pulleys and starting apparatus; also for split pulleys, 18-in. and 4-in. diameter.

Charles J. Britt, Wilmington, S. C., is organizing a company to establish and operate a local plant for the manufacture of traction engines and tractors. Operations will commence at an early date.

Maxwell Weinstein, Baltimore, manufacturer of toys, has acquired the plant and equipment of the International Wood & Paper Products Co., Calverton Road and Lexington Street, at a receiver's sale, for $50,000. It will be remodeled by the new owner for occupancy.

The Warren Power Co., Front Royal, Va., has purchased a hydroelectric power plant at Morgans Ford, Va. It will be extended and improved, and merged with the system of the company.

J. E. Kerr, 1106 Citizens & Southern Bank Building, Atlanta, Ga., is in the market for a 40-hp boiler and 30-hp. engine and auxiliary equipment.

Swift & Co., Waycross, Ga., are planning for the installation of a new refrigerating plant at their local meat-packing works. E. P. Thompson is local manager.

The J. M. Morse Lumber Co., Cogdell, Ga., is planning for the installation of new boring and turning machinery at its wood-working plant.

Pittsburgh

PITTSBURGH, Nov. 20.

LITTLE activity is noted in machine tools in this territory. Sales for the most part are of individual tools and are hardly numerous enough to be satisfactory, while it is rather discouraging to note that pending railroad lists are not showing signs of early letting. It is getting late in the year for the placing of business, and with inventory taking close at hand, some in the trade expect much business, against which quotations have gone in, to go over into the new year. Apparently, too, the weakness which has crept into the iron and steel market in the past three or four weeks is not without effect upon the attitude buyers now take toward the market, and while such price announcements coming out are advances, there is some doubt among buyers that they will lose much by waiting.

As far as steel company purchases are concerned, it may be said that the inability of railroads to take care of the steel freight offered has resulted in much piling of material, with the consequent tying up of considerable capital. Industry in Pittsburgh is not rolling up profits, because prices at which the output of the steel plants and foundries now is moving, in but few instances, are commensurate with producing costs. A local railroad which recently bought a 24-in. and a 30-in. lathe took used tools, because of prices. The Pittsburgh & Lake Erie Railroad has inquired for a 42-in. boring mill with side head and a 24-in shaper.

The Boye & Emmes Machine Tool Co., Cincinnati, this week notified its agents of an advance of 12½ to 15 per cent. in its entire line. Other lathe manufacturers are expected to advance prices also, but as yet have not acted.

Pending business in cranes remains heavy but actual orders are few. The Carnegie Steel Co. is likely to place the order for a couple of ladle cranes for its Duquesne works this week and it is believed the cranes to be placed by the Koppers Co. for the extension to the Carnegie Steel Co. by-product plant at Clairton also will be let this week. The Guibert Steel Co., Pittsburgh, has bought a 5-ton crane from the Barber, Foster Co., Cleveland. Local engineering companies are busy on a large number of projects and are calling for quotations for estimating purposes. It is now reported that the Michigan Steel Corporation, First National Bank Building, Detroit, is to build a steel works in addition to a sheet mill. The Crucible Steel Co. of America is asking bids on drives for a 10-in. and a 16-in. mill, which it plans to move from one of its Syracuse, N. Y., plants to Midland, Pa.

A vocational department will be installed in the new high school to be erected at Woodlawn, Pa., estimated to cost $500,000. Carlisle & Sharrer, Jenkins Arcade, Pittsburgh, are architects.

Hubbard & Co., 6301 Butler Street, Pitsburgh, manufacturers of bolts, nuts, rivets, etc., have filed plans for a new one-story building to cost $20,000.

The Patterson Township Light Co., Pittsburgh, has been formed under State laws to install and operate a power house and system in a section of Patterson Township. C. J. Braun, Jr., 435 Sixth Avenue, is treasurer.

The Metal & Thermit Corporation, 120 Broadway, New York, manufacturer of welding apparatus, etc., is taking bids for a new two-story plant on Fayette Street, Pittsburgh, 40 x 100 ft.

The J. G. Dickson Co., 241 South Main Street, Pittsburgh, manufacturer of sheet metal products, has acquired a building in the Northside district for a branch factory.

The Brown Coal Co., Uniontown, Pa., is planning for the erection of a tipple at its recently acquired coal properties in the Bear Mountain district, Barbour County, W. Va. The plant, with machinery, is estimated to cost $75,000.

The Evans Lead Co., recently organized as a subsidiary of the Ohio Alloy Co., Fostoria, Ohio, with a capital of $1,000,000, has plans in progress for a new plant at South Charleston, W. Va., where 15 acres has been purchased. It will consist of two main units, four-stories and one-story, each 50 x 180 ft., for the manufacture of lead products, and is estimated to cost $100,000. S. M. Evans is president of both organizations.

The Blackwood Electric Steel Foundry Co., Sandusky, Ohio, has tentative plans for a branch plant at Parkersburg, W. Va., to manufacture small steel castings.

The City Council, Wheeling, W. Va., C. H. Dowler, city manager, will receive bids until Dec. 12 for two engine-driven, low service centrifugal pumps; one turbine-driven, high service centrifugal pump; three 350-hp. boilers, with stokers and auxiliary equipment; also, for three low service and three high service centrifugal pumping engines, motor driven, in units of 10, 15 and 20 million gal.

A manual training department will be installed in the new junior high school, two stories, 150 x 156 ft., to be erected at Oil City, Pa. B. L. Bailey, Chambers Building, is architect.

Griffith, Rodes & Co., Charleston, W. Va., operating a sheet-metal plant, are planning for the installation of additional equipment.

The E. E. White Coal Co., Glen White, W. Va., will commence the erection of a steel tipple, to cost in excess of $50,000.

The Simmons Co., 824 River Street, Pittsburgh, manufacturer of metal beds and springs, is asking bids until Dec. 9 for a two-story and basement factory branch and assembling works on East River Avenue, 180 x 195 ft., estimated to cost approximately $150,000.

Buffalo

BUFFALO, Nov. 20.

THE plant of the Batavia Rubber Co., Batavia, N. Y., has been purchased at a receiver's sale by the Fred Stearns Co., 1832 Broadway, and the Taylor, Armitage & Eagle Co., 120 Broadway, both of New York, for about $110,000. The new owners propose to form a joint company and operate the plant for the manufacture of automobile tires and other rubber products.

The Rochester Packing Co., 900 Maple Street, Rochester, N. Y., is planning for the installation of additional refrigerating and cold storage plant equipment.

The T. W. Warner Corporation, Toledo, Ohio, manufacturer of gears, has preliminary plans for enlargements in the plant of the New Process Gear Corporation, Syracuse, N. Y., lately acquired in conjunction with W. C. Durant, head of the Durant Motors, Inc., 1819 Broadway, New York. The entire works, comprising more than nine acres of floor space on completion of expansion, will be used for gear production for the Durant and Star automobiles. T. W. Warner heads the company.

The Niagara, Lockport & Ontario Power Co., Niagara Falls, N. Y., is negotiating for the purchase of power plants at Elmira and Binghamton, N. Y., to be extended and improved, and merged with the company's system. Plans are being perfected for an extension of high-tension power service to these cities. The company has recently acquired power plants at Jamestown, Salamanca and Bradford, N. Y., and Meadville, Pa.

The Acheson Graphite Co., Buffalo Avenue, Niagara Falls, N. Y., manufacturer of electrodes, electrical specialties, etc., is planning for the erection of a one-story addition.

The United States Gypsum Co., 205 West Monroe Street, Chicago, has taken title to property at Oakfield, N. Y., comprising about 1000 acres of gypsum lands, and is said to be planning the erection of a new plant for the manufacture of blocks and other gypsum products.

A manual training department will be installed in the new three-story high school, 134 x 194 ft., to be erected at Hamburg, N. Y., estimated to cost $200,000, for which plans are being prepared by Frank Spangenberg, 250 Delaware Avenue, Buffalo, architect.

The Gray Machine & Parts Corporation, Batavia, N. Y., manufacturer of wrenches, automotive equipment, etc., contemplates the construction of a large addition.

E. L. Phillips & Co., 50 Church Street, New York, engineers, and George W. Olmstead, Ludlow, Pa., have negotiations under way for the purchase of the Hornell Electric Co., Hornell, N. Y. Extensions and improvements will be made in the plant and system. The Phillips company now controls the Nassau Light & Power Co. and the Long Island Power Co., New York.

The American Kardex Co., Main Street, Tonawanda, N. Y., manufacturer of office filing equipment, etc., is considering plans for a two-story addition, to cost $65,000.

The Jamestown Panel Co., Steele Street, Jamestown,

N. Y., will build a two-story addition. A list of equipment will soon be arranged.

The Crane Co., 836 South Michigan Avenue, Chicago, plans the erection of a new building at Church and Fourth Streets, Buffalo, for its local factory branch, estimated to cost $100,000.

The C. D. Reynolds Co., Alfred, N. Y., has plans for rebuilding its refrigerating and cold storage plant, recently destroyed by fire. New equipment will be installed.

Chicago

CHICAGO, Nov. 20.

NO further railroad buying has developed. The Chicago, Burlington & Quincy delays closing against its general list, and the Chicago, Milwaukee & St. Paul has just received figures on its inquiry issued two weeks ago. Inquiries for machine tools from miscellaneous sources are numerous, but there appears to be a growing disposition to postpone purchases until after the first of the year. This is reflected in a decline in the bookings of local dealers. There has also been a notable lack in sizable individual orders. Among the few reported was a purchase of seven turret lathes of various sizes by the Nash Motors Co., to be divided between its Milwaukee and Kenosha plants.

There are few changes in prices. The Rhodes Mfg. Co., Hartford, Conn., has advanced small shapers and slotters 20 per cent.

The Inland Steel Co. has ordered a 5-ton overhead traveling crane for its Chicago Heights plant from the Whiting Corporation.

The Ryan Car Co., with shops at Hegewisch, Ill., for the repair of freight cars, has leased the Elsdon car shops of the Grand Trunk at Fifty-first Street and Park Avenue, Chicago. The latter has been named the Elsdon Works of the Ryan Car Co., and will be used exclusively on repair work.

Voightman & Co., manufacturers of metal windows, 445-59 West Erie Street, Chicago, have purchased 65,000 sq. ft. at the northwest corner of Schubert and Keeler Avenues and are erecting a one-story plant to cost $125,000.

The Advance Window Frame Co., care Madison & Ibson Mfg. Co., manufacturer of sash and doors, 1818 West Austin Avenue, Chicago, is having plans prepared by Godfrey E. Larson, 4932 North St. Louis Avenue, for a one-story factory, 125 x 125 ft., at the southwest corner of West Division Street and Kildare Avenue, to cost $45,000.

The Ryan Car Co., Hegeswisch, Ill., has let a contract for an addition to cost $13,500.

The Mid-City Wire Frame Co., Inc., 1622 Fulton Street, Chicago, recently incorporated with $25,000 capital stock, will manufacture wire lamp shade frames, wire goods to order, wire dish drainers and wire canning racks. It has leased 24,000 sq. ft. at the address given and is in the market for the latest type of forming presses, welding machines and soldering outfits. Officers are Guy Dincognito, president; Michael Dincognito, vice-president, and Paul Dincognito, secretary-treasurer.

The Advance Wheel Mfg. Co., 125-127 West Illinois Street, Chicago, recently incorporated with $10,000 capital stock, manufactures polishing wheels for the jobbing trade only. Officers are James J. Manderscheid, president and general manager; P. Manderscheid, vice-president; Ralph J. Garvey, treasurer, and F. Garvey, secretary.

The National Electric Humidifier Co., 4311-13 East Ravenswood Avenue, Chicago, recently incorporated with $50,000 capital stock, manufactures tobacco humidifiers and kindred products. At present it is doing assembling work only, most of the parts being outside, but in due time expects to build or lease a plant for complete manufacturing operations. Officers are F. S. Stafford, president; F. Schaub, secretary-treasurer.

The National Copper & Steel Tank Works, 1275 Wade Street, Chicago, has purchased a newly constructed one-story factory, 75 x 125 ft., at 455-61 North Artesian Avenue.

The Duncan Foundry & Machine Works, Alton, Ill., is constructing an addition, 60 x 240 ft.

The Midland Iron Works, manufacturer of oil well tools, Billings, Mont., has started the construction of a branch plant, 30 x 60 ft., at Shelby and will equip it with a large steam hammer, a 26-in. x 18-ft. oil country lathe, engine lathes, drill presses, shapers, etc.

The Andrews Wire Works, Rockford, Ill., has let contract for an addition, 80 x 120 ft., to cost $20,000 exclusive of fixtures and machinery.

The Automatic Hot Machine Co., 726 Michigan Avenue, Chicago, recently incorporated with $75,000 capital stock, is a merchandising organization and will not engage in the manufacturing business. It will act as agent in the Chicago territory for the Scott-Newcomb oil burning heat machine manufactured by the Home Appliance Corporation, St. Louis.

The Western Engineering & Mfg. Co., 360 East Grand Avenue, Chicago, recently incorporated with $50,000 capital stock, is a subsidiary of the Western Valve Bag Co., and was organized to take over the manufacture of automatic bag-filling and other machinery heretofore manufactured by the latter company. The new organization will also manufacture the Cleveland friction clutch, formerly made by the Reliance Gauge Column Co., Cleveland.

The Chicago, Aurora & Elgin Railroad Co., Aurora, Ill., will make extensions in its power plant at Batavia, Ill., to cost $50,000. Additional equipment will be installed.

The Board of Directors, Olaf's College, Northfield, Minn., is revising plans for a new one-story power house to cost $50,000. John D. Small, 127 North Dearborn Street, Chicago, is mechanical engineer.

The Producers & Refiners' Corporation, California Building, Denver, Colo., has acquired property at Greensville, Wyo., for a new refinery. It will have an initial capacity of 10,000 bbl. per day, which will be more than doubled later. A pipe line 55 miles long will be constructed from the Ferris oil field to the new plant.

The Sioux City Gas & Electric Co., Sioux City, Iowa, has disposed of a bond issue of $3,500,000, a portion of the proceeds to be used for extensions and improvements. L. L. Kellogg is president.

A manual-training department will be installed in the new high school at De Witt, Iowa, estimated to cost $125,000.

The R. Hardesty Mfg. Co., Denver, Colo., manufacturer of power and irrigation equipment, has plans for the erection of new works, estimated to cost $200,000, including machinery. To carry out the project the company has disposed of a stock issue of $250,000.

The Linwood Stone & Cement Co., Kahl Building, Davenport, Iowa, has tentative plans for a new cement mill with daily capacity of 2000 bbl., estimated to cost $1,200,000.

Detroit

DETROIT, Nov. 20.

THE Ford Motor Co., Detroit, has awarded contract to the American Steel Co., Woodward Street, for a one-story assembling plant, 500 x 1400 ft., on property recently purchased at 180th Street and Torrence Avenue, Chicago. The new works will be equipped for a capacity of 450 assembled cars per day, and will be increased by the erection of additional stories later.

The Board of Education, Hancock, Mich., has plans in progress for a three-story high school, 80 x 335 ft., to cost $275,000, with vocational department to include a machine shop, forge shop, sheet-metal and wood-working shops, automobile and electrical shops. G. L. Lockhart, 1353 University Avenue, St. Paul, Minn., is architect.

Fire, Nov. 14, destroyed a large portion of the plant of the Monroe Body Co., Ludington, Mich., with loss estimated at $150,000, including machinery. It is planned to rebuild.

The Paige-Detroit Motor Car Co., Detroit, has taken over the former plant of the Hinkley Motors Corporation, West Fort Street, and will use the structure exclusively for assembling.

The Kalamazoo Paper Box Co., Kalamazoo, Mich., is perfecting plans for a three-story addition, totaling about 15,000 sq. ft. of floor area, estimated to cost approximately $200,000, including machinery.

The Chevrolet Motor Co., General Motors Building, Detroit, has plans nearing completion for a one-story works at Toledo, Ohio, 90 x 450 ft., for the manufacture of gears and transmission equipment; one-story heat-treating shop, 100 x 120 ft., and one-story power house, 60 x 90 ft. Albert Kahn, 1000 Marquette Building, Detroit, is architect.

The J. W. Murray Mfg. Co., 1975 Clay Street, Detroit, manufacturer of automobile fenders, etc., has awarded contract to J. H. G. Steffine, 3729 Cass Street, for a one-story addition.

The Ferndale Auto Parts Co., Ferndale, Mich., has been incorporated with a capital of $20,000 to manufacture automobile parts and other automotive equipment. The incorporators are Valentine S. Oberkoetter, Ferndale, and Albert C. Ratz, 4911 Wabash Avenue, St. Louis, Mo.

The Phillips Body Co., a subsidiary of the Fisher Body Co., General Motors Building, Detroit, has plans for new works at Ravenna, Ohio, to include the remodeling of an existing structure and the erection of a one-story addition, 40 x 100 ft., estimated to cost $45,000. The Carter-Richards Co., 923 Illuminating Building, Cleveland, is architect.

The Advance Specialty Co., Grand Rapids, Mich., has been organized under State laws to manufacture automotive products and mechanical specialties. The incorporators are Ralph O. Tucker, Laurence W. Smith and Irvin A. Kroft, 2 Tyler Court, Grand Rapids.

The Charles W. Marsh Co., Muskegon, Mich., manufacturer of leather packings and gaskets, is enlarging its plant by the construction of a building of 23,400 sq. ft. This will practically triple the company's productive capacity.

Indiana

INDIANAPOLIS, Nov. 20.

THE Northern Indiana Power Co., Kokomo, Ind., has been organized under State laws, with a capital of $3,500,000, to acquire and merge a number of electric power companies in this district. Application has been made for permission to purchase the companies operating at Kokomo, Rochester, Noblesville, Logansport, Sheridan and Roann, valued at $8,000,000, and for which bonds will be issued. Extensions and improvements will be made in the plants, including the installation of additional machinery. George J. Marott, president of the Indiana Railways & Light Co., Kokomo, heads the new organization.

The Tokheim Oil Tank & Pump Co., Wabash Avenue, Fort Wayne, Ind., has awarded contract to Wrigand & Son, Fort Wayne, for a one-story addition to cost $100,000, with equipment. C. O. Griffin is secretary.

The Puritan Bed Spring Co., 902 Kentucky Avenue, Indianapolis, manufacturer of wire springs, plans to immediately rebuild its enameling department, destroyed by fire Nov. 8.

The Machinery Clearing House, Indianapolis, has inquiries out for a 100-kw. generator, exciter, switchboard and auxiliary operating equipment. S. P. Grey is general manager.

The Period Cabinet Mfg. Co., Eighth Street, New Albany, Ind., has tentative plans in progress for a new two-story and basement addition, 100 x 200 ft., to cost $25,000, exclusive of machinery.

The Calumet Electric Co., Gary, Ind., has acquired the Wanatah-Lacrosse Electric Co., operating in the eastern section of Laporte County. The system will be merged with that of the purchasing company and extensions and improvements made in plants. Charles W. Chase heads the company.

Stockholders of the Home Brewing Co., Cruse and Daly Streets, Indianapolis, are considering a proposition to remodel the plant for a large ice-making and cold storage works, including the installation of new equipment. Newton Todd, 415 Lemcke Building, recent purchaser of the plant, is at the head of the project.

A complete ice-manufacturing and refrigerating plant will be installed in the proposed city market building, Indianapolis, estimated to cost $1,000,000. The site of the present market and Tomlinson Hall will be used. The City Council is in charge.

The Indiana Furniture Co., 316 West Indiana Street, Evansville, Ind., will install machinery at its plant to cost $20,000, in connection with the remodeling of a warehouse for manufacturing works.

Cleveland

CLEVELAND, Nov. 20.

LOCAL machine tool builders report an increase in sales and inquiries. Orders are mostly small, usually ranging from one to three machines, and come from scattered sources, although the activity is more pronounced in the automobile trade. Among lines that have improved considerably this month are automatic screw machines and turret lathes. Cleveland machinery houses continue to do a fair volume of business in single tools.

Orders placed during the week include one from the Standard Oil Co. for a lathe, milling machine, automatic screw machine, and a shaper, and another order booked involving about a half dozen machines. The Cleveland Board of Education has taken bids for 20 metal and wood-working machines for the John Adams School.

The Electric Auto Lite Corporation, Toledo, Ohio, has purchased 13 machines, seven grinding machines and six automatic screw machines from a local dealer. Two good orders for turret lathes, each for six or seven machines, were placed with a Cleveland builder during the week, one by the Nash Motors Co., Kenosha, Wis., and another by the Rickenbacker Motor Co., Detroit.

A Central Western turret lathe manufacturer has made new price adjustments, representing advances from a small amount up to 12½ per cent. Some machine tool builders still find that production costs are advancing, labor being the principal item that is increasing. However, they expect that the cost of castings will show some increase Jan. 1 compared with the prices for which they were able to contract in the last half of this year.

The H. H. Franklin Co., Syracuse, N. Y., has advised a Cleveland machinery manufacturer that it has postponed the erection of its plant for the manufacture of four-cylinder air-cooled motor cars.

The Ohio Pumping Machinery Co., Akron, Ohio, has taken bids for a new plant.

The American National Co., Toledo, Ohio, manufacturer of metal wheels, toy vehicles, etc., has purchased a site adjoining its plant and will build an addition estimated to cost $250,000. It will be seven stories, 100 x 300 ft., of steel and concrete.

The Fairfield Engineering Co., formerly operating a plant at Lancaster, Ohio, which was burned recently, has secured a new location in Marion, Ohio, where it will shortly begin the erection of new works, consisting of a main factory building, 50 x 80 ft., and a warehouse. The company manufactures conveying machinery. It will be reorganized and will have a capital stock of $150,000, of which $100,000 will be in common stock and $50,000 in preferred. Henry B. Walker is president.

The Hadfield-Penfield Steel Corporation, Bucyrus, Ohio, has completed an addition, 35 x 112 ft., to be used as a flask floor for small manganese steel castings, and has under construction a molding room, 75 x 80 ft.

The International Harvester Co., Chicago, plans the erection of a ten-story warehouse and service station on East Fifty-fifth Street, Cleveland, at an estimated cost of $300,000.

Milwaukee

MILWAUKEE, Nov. 20.

SALES of machine tools the past week were about equal to the average of the last three or four weeks, while inquiry was well sustained. The intermission of production by many passenger automobile concerns has developed inquiry on new and replacement needs of floor equipment which will be placed between now and spring. Railroad buying, so far as this market is concerned, is of limited volume. Local industries are fair buyers of miscellaneous equipment, but no large lots are in evidence. The Milwaukee Rolling Mill Co. is inquiring for some additional equipment for an extension of its main sheet mill. The Harley-Davidson Motor Co. is in the market for equipment for a new heat-treating building. Structural shops are getting some scattering business, which is divided principally into small jobs for industrial and commercial extensions, public garage construction, etc.

Fairbanks, Morse & Co., Chicago, is transferring the pump department of its Eclipse works in Beloit, Wis., to the branch works in Three Rivers, Mich., to make practically all of the Beloit plant available for the production of farm gas engines and combinations for agricultural purposes. The changes will require considerable retooling, which will be effected gradually. A large gray iron shop has been erected and equipped at Beloit during the past two years. W. C. Heath is general manager of the Eclipse works.

The Wisconsin Gray Iron Foundry Co., Milwaukee, has started work on additions to and alterations in its shop at Thirty-ninth Avenue and Burnham Street, to provide an increase of about 50 per cent in capacity. New melting, core making and cleaning room equipment has been purchased. E. T. Brennan is works manager.

The new building to be erected for the Harley-Davidson Motor Co., Milwaukee, by the Federal Engineering Co., 444 Milwaukee Street, local, as noted in THE IRON AGE of Nov. 16, will be equipped as a heat treating department. It will be 80 x 145 ft., one story, of brick and steel, and is estimated to cost $45,000, including equipment, which is to be purchased at once. William Davidson is general works manager.

The Milwaukee-Western Fuel Co., 120 Wisconsin Street, Milwaukee, has let the general contract to Klug & Smith, 30 Mack Block, local, for a two-story brick and concrete building, 120 x 138 ft., at Clinton and South Pierce Streets, to be equipped as a general machine, repair and service shop. It will cost about $80,000. A list of miscellaneous tool equipment, fixtures, etc., will be purchased. William F. Ardern is vice-president and general superintendent.

Thompson Brothers, Peshtigo, Wis., manufacturers of boats and canoes, are erecting a three-story addition, 96 x 160 ft., to be used largely for the production of hulls and equipment for power launches, a new department being established. The plant will contain more than 60,000 sq. ft. when the improvement is completed. Additional metal and wood-working equipment is being purchased.

Forest H. Hines, who retired recently from the Stevens Lumber Co., Rhinelander, Wis., has purchased five acres at Crandon, Wis., and will build a sawmill and a planing mill next spring at a cost of $50,000.

The F. Rassmann Mfg. Co., Beaver Dam, Wis., manufacturer of steel barn equipment and stable fixtures, is adding some new equipment for the production of malleable disk wheels for automobiles, and a line of children's coaster wagons.

The Wisconsin Cylinder Grinding Co., Milwaukee, has been incorporated with $15,000 capital stock by Herman Kiekow, Jr., who owns and operates a machine shop at 326 Sixteenth Avenue, which will be enlarged and re-equipped especially for gas engine repairs requiring tool operations.

The Standard & Specialty Porcelain Works, Inc., Sun Prairie, Wis., have been organized with $20,000 capital stock by R. A. Chase, A. F. Fuhrmann and O. E. Weisensel, all of Sun Prairie, to manufacture enameled goods. The new concern has taken over the plant of a defunct spark plug manufacturing concern and for the present will need little new equipment.

The Spring City Auto Co., Waukesha, Wis., has let the general contract to the Federal Bridge & Structural Co., local, for a brick and steel addition, 65 x 190 ft., for a service and repair works. Equipment has not yet been purchased. Peter and Ben Wolf are the proprietors.

The American Carbonic Machinery Co., Wisconsin Rapids, Wis., is erecting a brick and steel addition, 60 x 175 ft., to be equipped with electric welding devices, heating ovens, bending machines, etc., for the production of coils and tanks for its artificial ice machines. The improvements will cost about $75,000. Otto E. Roenius is general manager.

The Valley Paper Mills, Inc., Neenah, Wis., has let the general contract for a new pulp and paper plant estimated to cost, with equipment, approximately $800,000, to the Appleton, Wis., Construction Co. Work on the foundations was started Nov. 10. F. F. Wettengel, Appleton, is architect. G. W. Burnside is secretary and general manager.

The Phoenix Light Co., 525 Market Street, Milwaukee, manufacturer of electric light fixtures, portable lamps, etc., contemplates enlargement of its works and has issued $125,000 in preferred stock to finance the program, which will be undertaken shortly after Jan. 1. Details are not yet available. Joseph Sable is president.

The Wisconsin Ice & Coal Co., 216 West Water Street, Milwaukee, a dealer in coal and natural ice, has decided to enter the artificial ice production field and will build a two-story plant, 114 x 120 ft., at Thirty-first and Galena Streets, estimated to cost $75,000. Ice and refrigerating machinery probably will be purchased from local manufacturers. Luhr & Friedl, 154 West Randolph Street, Chicago, are in charge as architects and engineers. John H. Kopmeier is president of the ice company.

The Aluminum Specialty Co., Manitowoc, Wis., has contracted with William F. Mielke, local builder, for a three-story plant and warehouse addition, 32 x 150 ft., to be ready for equipment about Jan. 1. The building and machinery will represent an investment of about $50,000.

The Giljack Auto Truck Body Co., Jackson, Wis., is a new $25,000 corporation organized by W. J. Gilbert, E. A. Prahl and P. J. Hayes to engage in the manufacture of special body equipment for commercial motor vehicles.

The Aug. C. Beck Co., Sixth and East Streets, Milwaukee, manufacturer of wooden boxes, hardwood flooring, etc., let the general contract to H. Schmitt & Son, Inc., 430 Farwell Avenue, for a two-story brick and mill wood-working factory, 145 x 200 ft., to replace the main building destroyed by fire recently. Practically a full complement of production machinery and some new engine and boiler house equipment is being purchased.

The Automobile Gasoline Gauge Mfg. Co., Eau Claire, Wis., has been incorporated with a capital stock of $20,000 by C. E. Knobloch, E. A. Kuehl and V. X. Stiets, who have leased an existing building and will manufacture metering and measuring devices.

Cincinnati

CINCINNATI, Nov. 20.

THE machine tool trade is quieter than it has been in many weeks, and although a few orders for single machines are being booked, lack of heavy purchases, recently made by railroads and industrial companies, makes the market dull by comparison. Some manufacturers are of the opinion that recent price advances, which had the effect of bringing to a head a great number of deals which had been hanging fire for some time, may have had some effect on the situation, in that it practically cleaned up all the lists of tools required, but the more general opinion seems to be that, with the rapid approach of the inventory period, buyers are content to wait until next year's appropriations have been made up. There are, however, a number of good prospects out, and it is expected that action on the Pennsylvania list will be taken before the end of the week. This is expected to be the biggest purchase of the year, as it is said that in addition to the tools already inquired for, a number of additional machines for various shops will be bought.

The Board of Education, Columbus, Ohio, will open bids Dec. 11 at its offices in the Ohio National Bank Building, on two 12-in. speed lathes and three 30-in. band saws and equipment. Proposals must be submitted on an f.o.b. Columbus basis, and must be accompanied by a certified check equal to 20 per cent of the amount of the bid. Bids may be made separately or on all equipment.

The Stutz Motor Car Co. of America, Indianapolis, which recently passed into the control of Charles M. Schwab and associates, has purchased the property of the Empire Motor Co., Indianapolis, and will erect a number of additional buildings for the production of a new six-cylinder car. The present plant of the company will be devoted exclusively to the production of four-cylinder cars.

The Union Traction Co. of Indiana has completed plans for an addition to its central power plant at Anderson, Ind., which will provide sufficient power to operate its 460 miles of electric car lines throughout the State. New power generating equipment will be installed.

The Gulf States

BIRMINGHAM, Nov. 20.

A SPECIAL meeting of stockholders has been called by the Magnolia Petroleum Co., Galveston, Tex., for Dec. 2 to increase the capital from $120,000,000 to $180,000,000, a portion of the proceeds to be used for extensions and improvements. W. C. Proctor is treasurer.

The Peninsular Ice & Cold Storage Co., Grandview Avenue, Daytona, Fla., is arranging for a new ice-manufacturing and refrigerating plant.

G. L. Jones, Marble Falls, Tex., operating the local electric light and power plant, recently acquired from M. H. Reed, has plans in progress for extensions and improvements, including the installation of additional equipment.

The Brown Mfg. Co., Houston, Tex., manufacturer of screens and kindred wire equipment, has arranged for the establishment of a branch factory at San Antonio, Tex.

The Oak Cliff-Nash Co., Oak Cliff, Dallas, Tex., recently organized to represent the Nash automobile, has arranged for the erection of a new service and repair works at Tenth and Marsalis Streets. Prior to completion and the installation of equipment, the company will be temporarily located at 126 Marsalis Street. D. D. McLarty heads the company.

The plant of the Liberty Oil Refining Co., Cisco, Tex., has been acquired by new interests, headed by L. H. Christman. Plans for extensions and improvements are being prepared, including the installation of additional equipment to increase the capacity to 3000 bbl. per day. The work is estimated to cost $50,000.

The Chamber of Commerce, Florence, Ala., is perfecting plans for a hydroelectric power plant on Cypress Creek, for local light and power service. It is proposed to organize a company to operate the property.

A manual training department will be installed in the proposed junior high school buildings to be erected at Hubbard and Tenth Streets, Jacksonville, Fla., for which bids are being received on a general contract until Dec. 9. The cost is estimated at $300,000. Greeley & Benjamin, office of the school board, are architects.

The Santa Fe Railroad Co., 80 East Jackson Boulevard,

Chicago, has arranged for the immediate erection of its proposed new boiler and locomotive shops at Albuquerque, N. M., designed to be the largest shops of their kind on the system. The plant will cost in excess of $200,000, with machinery.

The Catron Mfg. Co., Bonham, Tex., manufacturer of visible pumps and similar equipment, has leased the Steger Building, South Center Street. The present works will be removed to this location and considerably increased with the installation of additional machinery.

Fire, Nov. 12, destroyed a portion of the oil storage and distributing plant of the Gulf Pipe Line Co., Humble, Tex., a subsidiary of the Gulf Production Co with loss estimated at about $500,000, including tanks, machinery, stock, etc. It is planned to rebuild.

The Goddard Lumber Co., Wetumpka, Ala., is planning the erection of a new mill at Washington Park, Ala., to replace its local plant, recently destroyed by fire with loss of $75,000. The local site will be discontinued.

A manual training department will be installed in the proposed new high school to be erected at Canyon, Tex., estimated to cost $100,000. E. F. Rittenbury, Amarillo, Tex., is architect.

The Marion County Ice Co., Ocala, Fla., is planning for the installation of new electrical and mechanical equipment, including generator, engine, etc., and will soon have inquiries out for the machinery.

A complete mechanical repair shop will be installed in the new two-story works, 40 x 60 ft., to be erected at Evergreen and Young Streets, Dallas, Tex., by the Safety Tire Repair Co., 517 South Ervay Street. W. E. English is head.

The Deeson Compress Co., Deeson, near Rosedale, Miss., has tentative plans for rebuilding its plant, destroyed by fire Nov. 14, with loss estimated at $150,000, including equipment.

The West Texas Utilities Co., Stamford, Tex., has plans under way for extensions and improvements in the local power plant and system, operated in the name of the American Public Service Co., estimated to cost approximately $50,000.

New pumping machinery and other power equipment will be installed at the waterworks, Elgin, Tex., by the Common Council, in connection with extensions and improvements to cost $40,000.

The Attalla Motor Co., Attalla, Ala., will install a complete machine shop and mechanical repair department in its new building, 50 x 125 ft., now in course of erection on Fourth Avenue.

A vocational department will be installed in the proposed new high school to be erected at Galveston, Tex., estimated to cost $500,000. De Witt & Lemmon, Dallas, Tex., are architects.

Electrically-operated pumping machinery and other mechanical equipment will be installed at the waterworks, Panhandle, Tex., in connection with enlargements in the plant, estimated to cost $54,000.

Plans are nearing completion for rebuilding the power plant at the Chickasaw County Agricultural High School, Buena Vista, Tex., recently destroyed by fire.

The Pacific Coast

SAN FRANCISCO, Nov. 14.

THE Martin Products Co., Oakland, Cal., manufacturer of automobile equipment, metal stampings, etc., has leased property in Emeryville for a new plant. Immediate possession will be taken and equipment installed. O. G. Meyers is president and C. W. Martin, vice-president.

The Shell Oil Co., San Francisco, has awarded contract to the William A. Heitman Construction Co., Merritt Building., Los Angeles, for a new refinery at Wilmington, Los Angeles harbor. It will include a power plant, machine shop and other structures, and is estimated to cost $5,00,000 with machinery.

N. T. Edwards, Orange, Cal., operating a local ice-manufacturing plant, has plans under way for new works on Walnut Avenue, estimated to cost $50,000.

The Teetor Adding Machine Co., 502 Pacific Finance Building, Los Angeles, has awarded contract to Hamm & Grant, Ferguson Building, for its one and two-story plant at Pomona, Cal., 100x300 ft., and 35x100 ft., respectively.

The San Joaquin Light & Power Corporation, Fresno, Cal., has disposed of bonds to an amount of $140,820, a portion of the proceeds to be used for extensions.

The Banner Refining Co., Kohl Building, San Francisco, has plans in progress for a new refinery in the Islais Creek section, to cost approximately $90,000. F. G. White, Ferry Building, is engineer.

The Western Stove Co., Oakland, Cal., is negotiating with J. H. Paige, secretary of the Chamber of Commerce, Pomona, Cal., for a site for a new plant estimated to cost $75,000. J. J. Vaughn is head.

L. E. Chastain and D. A. New, Van Nuys, Cal., have purchased property, 200x255 ft., at Bessemer Street and Cedros Avenue, for a new ice-manufacturing and refrigerating plant. A company will be formed headed by the parties noted, and plans prepared at once.

The Veneer Products Co., Seventeenth and Dock Streets, Spokane, Wash., will make extensions in its power plant and mill. The latter will be increased from 50 to 250 tons in capacity. The expansion is esimated to cost $200,000.

The Central South

ST. LOUIS, Nov. 20.

THE Electric Storage Battery Co., 1619 Walnut Street, Kansas City, Mo., with headquarters at Philadelphia, has awarded a contract to the Fogel Construction Co., Reliance Building, for the first unit of its local plant, one-story and basement, 160 x 220 ft., estimated to cost $120,000. Hans Von Unwerth, Finance Building, Kansas City, is engineer.

The Common Council, Fredericktown, Mo., is arranging for the installation of additional equipment at the municipal power plant, to cost about $25,000.

The Coleman Lamp Co., 220 North St. Francis Street, Wichita, Kan., has awarded contract to John M. Denny, 1450 North Lawrence Street, for a one-story addition for the manufacture of stoves. H. W. Strong is general manager.

The Cincinnati, Newport & Covington Railway Co., Newport, Ky., a subsidiary of the Columbia Gas & Electric Co., Cincinnati, operating electric power utilities, is disposing of a bond issue of $4,000,000, a portion of the proceeds to be used for extensions and improvements.

The United Railways Co., Thirty-ninth Street and Park Avenue, St. Louis, will construct by day labor its new one-story power plant at Union Avenue and Maple Street, to cost in excess of $75,000.

Fire, Nov. 9, destroyed the plant of the Continental Machinery Co., Chattanooga, Tenn., with loss estimated at $200,000, including machinery. It is planned to rebuild.

The Common Council, Poplar Bluff, Mo., is planning for the installation of additional machinery at the municipal electric power plant, to cost about $20,000.

The Galvin Electric Mfg. Co., St. Louis, manufacturer of small motors, radio equipment, etc., has acquired a building at 3320 South Broadway, with considerably increased floor space, and will remove to this location at an early date. Additional equipment will be installed. J. F. Galvin is president.

The White Co., 2001 Grand Avenue, Kansas City, Mo., manufacturer of automobile trucks, with headquarters at Cleveland, has awarded contract to the George M. Bliss Construction Co., 510 Lathrop Building, for a two-story and basement service and repair building at Twenty-ninth and Walnut Streets, 100 x 250 ft., estimated to cost $100,000.

The Merit Veneer & Box Co., Pine Bluff, Ark., recently organized, has acquired a building for the establishment of its proposed plant. Equipment will be purchased at once. H. F. Buechner is secretary and treasurer.

H. S. Hoefflin, 1516 North Waco Avenue, Wichita, Kan., operating a general woodworking plant, is planning for the installation of motors, belting, shafting and other equipment. H. S. Hoefflin heads the company.

The Louisiana & Arkansas Railway Co., Stamps, Ark., has awarded contract to Herman & McCain, Little Rock, Ark., for a new one-story locomotive repair shop, estimated to cost $150,000. Harrington, Howard & Ash, Orear-Leslie Building, Kansas City, Mo., are architects.

The Missouri-Kansas-Texas Railway Co., St. Louis, will soon commence the erection of additions to its grain elevator at Kansas City, Mo., estimated to cost $2,000,000. The machinery installation will approximate $800,000, including motors and power equipment, conveying machinery, etc.

The Light Development Co., St. Louis, Railway Exchange Building, has preliminary plans under way for a new electric generating plant on the Mississippi River, with initial capacity of 20,000 kw., estimated to cost $1,750,000.

The Common Council, Wetumka, Okla., has authorized plans for extensions and improvements in the municipal electric plant and system, including the installation of additional equipment. Plans and estimates of cost will be made by V. V. Long & Co., 1300 Colcord Building, Oklahoma City, Okla., and bonds voted.

The plants and properties of the Memphis Gas & Electric Co., Memphis, Tenn., have been acquired at a receiver's sale by new interests, headed by H. C. Abell, 120 Broadway, New York, banker, for $10,000,000. The company will be reorganized under the name of the Memphis Power & Light Co.

The new owners have agreed to expend $2,000,000 within 18 months in extensions and improvements.

A manual training department will be installed in the new two-story and basement high school to be erected at Pleasant Hill, Mo., estimated to cost $125,000. W. H. Sayler & Co., 306 Mutual Building, Kansas City, Mo., are architects.

The National Forge Co., 1572 Cherokee Road, Louisville, will commence the erection of a one-story foundry, 60 x 120 ft., at 2920 Garland Avenue. Whitfield Clark is president.

The Kansas City Bolt & Nut Co., Winchester Avenue, Kansas City, Mo., has disposed of a common stock issue of $400,000, a portion of the proceeds to be used for extensions.

The Gager Lime & Mfg. Co., Chattanooga, Tenn., is planning for the installation of additional equipment, including disk crusher, stone washer of 200 tons capacity, operating equipment and other mechanical apparatus. M. P. Kennedy is secretary.

A vocational department will be installed in the new two-story and basement high school, 70 x 130 ft., to be erected at Morristown, Tenn., estimated to cost $180,000, for which bids will soon be asked. C. T. Jones, 1102 James Building, Chattanooga, Tenn., is architect.

J. B. Greenway, Roanoke, Va., is organizing a company to establish and operate a plant at Columbia, Tenn., for the manufacture of automobile tires and tubes and other rubber products.

The Aeromotor Co., 1215 West Eighth Street, Kansas City, Mo., recently organized with a capital of $350,000 to manufacture windmills and kindred machinery, has awarded contract to Fred Crites, 2136 Belleview Avenue, for the initial building of its proposed plant at Ninth and Hickory Streets, one-story and basement, 118 x 120 ft. Henry Thompson is one of the heads of the company.

The City Light & Traction Co., Sedalia, Mo., has plans for a new power house to cost about $350,000.

Canada

TORONTO, Nov. 20.

BUSINESS in machine tools still shows improvement, and while railroads are buying only in a small way, industrial concerns are entering the market for a wide variety of equipment. Inquiries leading to sales are numerous and it is the opinion that November sales will be well up to the mark reached during October. Equipment for iron and steel-working plants is in stronger demand, but wood-working tools and machinery continue to head the list of requirements. Small tools are also more active.

Increased prices which recently went into effect continue to hold, but in some localities shading is still resorted to by some dealers.

The Levis County Railway, Levis, Que., is in the market for a 32-in. lathe, screw jack car hoist, shaper, vertical drill, double-end emery grinder, combination circular saw, planer, band saw and small lathe. E. E. Weyman is manager.

The J. Buckley Estate, Nordin, B. C., will rebuild a sawmill recently destroyed by fire, and is in the market for equipment.

The Standard Shingle Co., Vancouver, B. C., will erect a mill and is asking information regarding equipment.

The producer house of the Sun Brick Co., Don Valley, Todmorden, Toronto, was destroyed by fire with a loss of $10,000. It will be rebuilt immediately.

The plant of the Electroplax Co., Mount Dennis, Ont., manufacturer of electrical insulation equipment, etc., was destroyed by fire with a loss of $100,000. The bulk of the damage was to the machinery and contents of the plant.

The British Columbia Electric Co., Vancouver, B. C., in addition to improvements to its power plant on the Stave River, is planning the construction of a new power house further down the river, to cost $10,000,000. It is estimated that the new plant will develop 100,000 hp.

Stetson-Cutler & Co., St. John, N. B., will rebuild a planing mill recently destroyed by fire and are interested in equipment.

The National Brake Co., Ellicott Building, Buffalo, N. Y., is preparing to erect a branch plant at Bridgeburg, Ont.

Eucher Caron & Son, 158 Chamberlain Street, Hull, Que., have the general contract for the erection of a plant in the Wrightville district, to cost $55,000, for the Lion Meade Tire Co., Hull.

Preliminary plans are being prepared for a dam and power house, to cost $700,000, at Drummondville, Que., for the Southern Canada Power Co., 20 St. Nicholas Street, Montreal. J. H. Trimmingham is chief engineer.

Logan Township, Ont., will install an electric power plant and distributing system. L. G. Rock, Brodhagen, Ont., is clerk.

The Standard Steel Co., Welland, Ont., is contemplating establishing a plant in Quebec for the manufacture and fabrication of steel for bridge and general construction purposes. It is stated that it will operate under the name of Le Construction Cie, Ltd., and will begin work on a plant about two miles from the city next spring. Between 40 and 50 men will be employed at the start.

The H. Mueller Mfg. Co., Ltd., Sarnia, Ont., manufacturer of plumbers' supplies, etc., will install considerable new equipment to increase its output.

The National Cash Register Co. of Canada, Ltd., Toronto, has purchased a four-story building at the corner of Bloor and Dufferin Streets, which will be equipped and used as a manufacturing plant. It has also secured adjoining land for additions.

The Dominion Insulator & Mfg. Co., a branch of the Ohio Brass Co., Mansfield, Ohio, has started work on the erection of a plant at Niagara Falls, Ont., which is expected to be completed by the first of the year. The company will manufacture high-tension porcelain insulators, trolley material, rail bonds for electric railroads and mines, electric car equipment, etc.

The Cling Cutlery Corporation of Canada, Ltd., has taken over the building formerly owned by the Fulton Motor Co., Welland, Ont., and will convert it into a plant for the production of cutlery, etc.

The Canadian Advance Car Mover Co., Welland, Ont., recently incorporated with a capital stock of $40,000 for the manufacture of railroad car movers, safety car wrenches, car door rollers, tools, etc., contemplates establishing a local plant. The provisional directors include Richard and Walter Miller, both of Appleton, Wis.; Henry J. Adian, Niagara Falls, N. Y., and Richard D. Spencer, Welland, Ont.

Plans have been prepared for the erection of a plant at Welland, Ont., for the Welland Packing Co., Ltd. It will be three stories, 70 x 96 ft., of concrete and steel. The building will cost $50,000 and machinery and equipment $25,000. The directors include Frank Ahman, president, Welland, Ont.; George A. Reist, vice-president, Kitchener, Ont.; Nicholas Verves, secretary, Welland.

The Sully Brass Foundry, Ltd., Toronto, is equipping a new brass foundry at 2388 Dundas Street West, for the production of brass, bronze and aluminum castings.

The Beaver Laundry Machinery Co., Ltd., Toronto, is occupying temporary quarters at 80 Perth Avenue, but later intends to erect a new plant. The company is capitalized at $50,000. W. G. Fraser, president of the Beaver Soap Co., is president, and H. L. Howard is resident manager.

W. D. Beath & Son, 394 Symington Avenue, Toronto, engineers, are building a two-story boiler room, 60 x 152 ft. in connection with their plant.

James Stewart, president Maple Leaf Flour Mills and of the James Stewart Grain Co., will erect a terminal elevator at Port Arthur, Ont., to have a capacity of 1,500,000 bushels and cost $850,000. Construction will be started during the winter.

Crucible Steel Showing Profit

Chairman Horace S. Wilkinson of the Crucible Steel Co. of America told the stockholders at the annual meeting that the company is now operating at a profit. Mr. Wilkinson said in part:

"The month of October shows the largest increase in orders over the preceding month that we have had at any time since the depression began, and we take pleasure in stating that it is our belief that the tide has turned, and that in the near future we will be able to make a substantial profit. The item of stock subscription mentioned in your annual report has been paid and the $5,000,000 has been deposited to the credit of the company. The bills payable have been paid and the company now has no outstanding current liabilities except the usual monthly bills which are for the material used in each current month's business. We look forward with great confidence."

The directors of the company were re-elected.

The Osgood Co., Marion, Ohio, manufacturer of steam shovels, has established a district sales office at 30 Church Street, New York, M. E. Pullen in charge. All business formerly handled by M. E. Davis will be handled through this office.

The foundry formerly owned by the Timken-Detroit Axle Co., 100 Clark Avenue, Detroit, has been purchased by the Dayton Malleable Iron Co., Dayton, Ohio.

The present address of the Robinson Adjustable Center Co., manufacturer of centers with adjustable high speed steel points, is 9552 Quincy Avenue, Detroit. It is moving into its new factory at 31 Woodbridge Street.

STEEL AND INDUSTRIAL STOCKS

Sentiment Shows Improvement Following Pessimism a Few Days Before

In contrast to the pessimism prevalent in the early part of last week when wild rumors were abroad, the sentiment insofar as steel and industrial stocks were concerned brightened up at the close, even in spite of the irregularity. In the wake of Monday's numerous declines came a severe reaction and the heaviest selling for months, bringing drops of from one to five points. Impressive gains were made at midweek in Steel, Republic, Baldwin and American Car. What turned the tide none could tell, but the abrupt upward reaction from earlier declines may be remembered as an instance where stocks did not move at all in accord with tangible events, but rather in line with confused guesses and vague apprehensions. Trading lagged toward the end, transactions dividing about equally between strength in stocks like Baldwin and Continental Can, and weakness in such issues as Replogle.

	Low	High		Low	High
Allis-Chalmers...	38	42	Int. Har.	98¾	104½
Allis-Chal. pf....	95	95	Int. Har. pf.....	116¼	116½
Am. B. S. & Fdy.	70½	73	Lackawanna Stl.	75½	79¾
Am. B.S. & F. pf.	110	110	Lima Loco.	56	57⅞
American Can...	68¼	72⅞	Midvale Steel...	27¼	31
Am. Can pf.....	110⅝	111⅛	Nat.-Acme	9½	12½
Am. Car & Fdry.	175	180¾	Nat. En. & Stm.	62	64¼
Am. Car & F. pf.	124	124	Nat. E. & St. pf.	100½	102
American Loco..	120	124	N. Y. Air Brake	25½	32¾
Am. Loco. pf....	121	121½	Nova Scotia Stl.	30	30
Am. Radiator...	112	116	Otis Steel	8	9
Am. Steel Fdries.	41½	43¼	Otis Steel pf....	45	51
Am. Stl. Fd. pf..	104½	105½	P'burgh Stl. pf..	92	92
Baldwin Loco...	121¼	126⅝	Pressed Stl. Car	78	83¼
Bald. Loco. pf..	116½	118	Pressed Steel pf.	100	101
Bethlehem Steel.	63	67	Ry. Steel Spring.	109	114
Beth. Steel Cl. B	63⅞	68⅝	Ry. Stl. Spg. pf..	120	120
Beth. Stl. 8% pf.	111	111	Replogle Steel...	21¾	26¼
Brier Hill.....	15	15½	Republic	46	47⅞
Br. Em. Steel...	9	9¼	Republic pf.....	80	82
Br. Em. Stl. 1 pf.	67¼	69	Sloss	39¼	42½
Br. Em. Stl. 2 pf.	27½	29¼	Steel of Canada.	59¾	61
Cambria Steel...	41	41	Superior Steel...	27	30½
Chic. Pneu. Tool	78½	80¾	Transue-Williams	32½	33
Colo. Fuel.....	26	28¾	Un. Alloy Steel..	36	36
Crucible Steel...	61	75¼	U. S. Pipe.....	25	28½
Crucible Stl. pf..	92	94⅝	U. S. Pipe pf....	63	67¼
Deere pf.	73	74	U. S. Steel.....	102¾	106¼
Gen. Electric....	172	177	U. S. Steel pf...	120½	121⅝
Gt. No. Ore Cert.	10½	11⅛	Vanadium Steel.	34	36¾
Gulf States Steel	69	83⅜	Va. I., C. & Coke	57	57
Inland Steel....	44	44	W'house Air Br.	95	98

Industrial Finances

The Moore Drop Forging Co. has changed its authorized common stock from 50,000 shares of $5 par to 1655 shares of $100 par, authorized common then to be increased to 20,000 shares of $100 par. The balance sheet of Oct. 2, showed a surplus of $2,183,502.

The Standard Sanitary Mfg. Co., Pittsburgh, has declared a stock dividend of 40 per cent on its common stock, in addition to the regular quarterly cash dividend of 2 per cent and an extra of 2 per cent.

The American Steel Foundries has declared a stock dividend of 18 per cent, equivalent to $6 per share on outstanding common stock, payable Dec. 30 to stock of record Dec. 9. The company reports a surplus for the first nine months of $2,317,357 after charges and Federal taxes. Its net earnings were $3,157,463.

The real estate, buildings and equipment of the Pfau Mfg. Co., Norwood, Ohio, plumbing supply manufacturers, will be sold at public auction on Nov. 22.

The Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., has sold to the Continental & Commercial Trust Co., Chicago, an issue of $850,000 first mortgage serial 6½ per cent gold bonds. The money will be used to redeem an issue of the company's first mortgage serial 7 per cent gold bond issue.

For the nine months ending with September earnings of the Timken Roller Bearing Co. amounted to $6,339.000, after deductions for depreciation and taxes. October earnings were larger than those for September, and the showing so far this month is on a par with October.

The Apperson Brothers Automobile Co. has sold $700,000 10-year 7 per cent first mortgage bonds to New York and Chicago bankers. These bonds are a direct obligation and constitute the only funded indebtedness. Money derived from the sale of these bonds will enable the company to place on the market a popular-priced car, of which it is proposed to manufacture approximately 4000 the first year in addition to 2500 eight-cylinder cars.

An issue of $2,000,000 15-year 7 per cent sinking fund bonds has been sold by the Rolls-Royce Co. of America, Springfield, Mass. Funds derived from their sale will be used to refund higher interest-bearing obligations and as working capital. The bonds are dated Sept. 1 last and carry a sinking fund provision dated 1924.

Bankers have purchased $750,000 McNab & Harlin Mfg. Co. 20-year 7 per cent first mortgage sinking fund bonds, thereby providing additional working capital for the company, which produces iron, semi-steel, steel and brass pipes and fittings.

The Central Vermont Railway has sold $754,000 6 per cent equipment trust notes, series E, dated May 1 last and maturing Nov. 1, 1922, to 1927, at the rate of $49,000 semi-annually, and Nov. 1, 1927, to May 1, 1930, at the rate of $44,000 semi-annually. Money derived from the sale of these notes will be used to pay in part for 500 30-ton steel underframe rebuilt box cars and 200 50-ton all-steel hopper rebuilt coal cars purchased from the American Car & Foundry Co. at a cost of $1,107,571.

The board of directors of the Reynolds Spring Co., Jackson, Mich., has declared a dividend of 1¾ per cent on preferred A and B stock, payable Jan. 1, 1923, to stockholders of record Dec. 18, 1922.

In the report of the Carbon Steel Co., Pittsburgh, for the fiscal year ended Sept. 30, an operating loss for the year of $366,135 is shown, after taxes, insurance, depreciation, etc. No dividends were declared. The total reduction made on the surplus account was $542,023.

The Remington Typewriter Co., Bridgeport, Conn., has paid off during the past year all of its $1,650,000 bank loans, and in addition has paid $90,000 for agencies in Germany. The sale of the company's products, both in this country and abroad, is steadily expanding.

The LaSalle Iron Works, 3110 LaSalle Street, St. Louis, with assets of $31,760 and liabilities of $10,560, has increased its capital stock from $10,000 to $30,000, of which $11,200 is paid. The additional capital is to be used for enlarging its plant and installing new equipment.

A voluntary petition in bankruptcy was filed in the Federal Court of Cleveland by the Holmes Automobile Co., Canton, Ohio. The company was organized several years ago to manufacture air-cooled motor cars. Its liabilities are placed at $1,293,415 and assets at $1,136,548.

The Republic Tool & Mfg. Co., having plants in Cleveland and Detroit, has been placed in the hands of Elliot E. Sterns as receiver, who was appointed in that capacity by the Federal Court. The company was formed in 1919 as the consolidation of the Cleveland Power Transmission Co., Diamond Stamping Works, Clyde C. Lowe Co. of Cleveland, and the Detroit Reamer & Tool Co., Detroit. The company has been in the hands of a creditors' committee and its Cleveland plant at 1946 East Fifty-fifth Street was sold recently to the American Stamping Co.

The Royal Machine & Foundry Co., Oshkosh, Wis., has filed a voluntary petition in bankruptcy, scheduling liabilities at $26,321 and claiming assets of $62,770. W. C. Jennerjahn is president. The first meeting of creditors was held on Nov. 17.

The Steelcraft Corporation of America, Cleveland, with plants at Long Island City and Lititz, Pa., manufacturer of metal safes, filing equipment, etc., is disposing of a bond issue of $600,000, a portion of the proceeds to be used for extensions and improvements. B. H. Sinks is president.

The Packard Motor Car Co., in its annual report for the fiscal year ended Aug. 31, shows net profits amounting to $2,115,828 on factory sales of $38,000,000. Surplus as of the same date stood at $17,004,438, giving the common stock a book value of $24.31 per share.

A special meeting of the stockholders of the Sterling Steel Foundry Co., Braddock, Pa., will be held Dec. 28 to consider an increase in the capitalization of the company from $1,000,000 to $2,000,000.

The Pittsburgh Steel Co. has declared the regular quarterly dividend of its preferred stock of 1¾ per cent, payable Dec. 1.

The Hampden Grinding Wheel Co., Springfield, Mass., proposes to increase its capitalization by issuing 1,000 preferred shares, at $100 par, 350 shares of the new stock to be used for the cancellation of indebtedness. Willard P. Leshure is president.

The Storms Drop Forging Co., Springfield, Mass., has made a change in its capitalization. The outstanding 12,000 shares of common stock, par $25, were first changed to 12,000 shares of no par value, and then the number outstanding reduced to 3,000 shares. Frank F. Storms is president and Frank O. Wells, Greenfield, Mass., treasurer.

The Bee Machine Co., Lynn, Mass., dealing in various kinds of machinery and machine tools, has been incorporated under Massachusetts laws, with Vincent W. Burke president and Frank S. Belliveau treasurer.

Plans of New Companies

The Diamond Automotive Co., 302 McDougal Street, Brooklyn, has been incorporated with a capital of $100,000, to manufacture automotive equipment and parts. It has taken over the property formerly belonging to the Peerless Radio Co. and has installed a part of the machinery required, but is still in the market for the rest. Chief among its products will be door handles and steel braces, the latter requiring quantities of cold rolled strip. Production in any considerable quantity will probably be delayed for a time awaiting repairs and installations. The incorporators are W. Robertson, L. Schroeter and W. J. Power. After operations are under way, the company plans to manufacture a general line of automotive accessories.

Edward F. Maher, Inc., 522 Fifth Avenue, N. Y., has been incorporated with a capital stock of $25,000, to manufacture iron and steel products. Immediate plans provide for a warehouse to handle a complete line of iron and steel products, particularly sheets and strips. If the company fails to secure property which it is now attempting to lease, it will build its own warehouse. Edward F. Maher, who has been 15 years in the steel business, during the last six of which he has been connected with the Wheeling Metal & Mfg. Co., Wheeling, W. Va., is head of the firm.

The Miller-Harmon Corporation, New York, has been incorporated with a capital stock of $50,000, to manufacture machinery and parts. It is uncertain as to its plans for the future but manufacturing will most likely be let out to contract. The incorporators are: L. Weinberg, P. Deschere and G. Herrmana. S. L. Samuels, 60 Broadway, New York, is corporate representative.

The Star Wire Diamond Die Corporation, 111 Delancey Avenue, New York, was recently incorporated with a capital stock of $30,000, to manufacture dies and other mechanical products. Manufacturing will be delayed for some time while the organization is being completed. H. Mestel heads the company.

The Mid-States Rubber Co., Evansville, Ind., which was recently incorporated, will rent buildings and install machinery as soon as possible. If adequate space cannot be obtained the company will build a plant of its own. Address J. S. Hopkins, secretary, Never Split Seat Co., Evansville, Ind.

The Fay Mfg. & Supply Co., Inc., 238-40 West Fifty-third Street, New York, which was recently incorporated, is engaged in large quantity production of automatic screw machine products and handles anything in this line from $\frac{1}{16}$ to 2 in. in diameter. The company has a fully equipped modern shop. L. S. Liberman is treasurer, and he with H. C. Lewis and J. E. Lief are the incorporators.

The Pohlig Mfg. Co., Stewart Avenue and Harrison Place, Brooklyn, N. Y., has been incorporated with a capital of $500,000, to manufacture automobile fenders and other sheet metal products. Nothing definite has been decided as yet regarding the future plans of the company. The incorporators are: H. P. Griffin, S. C. Whitbeck and W. S. Tienken.

Abraham Isaac, dealer in scrap iron, Elizabeth, N. J., has opened an office at Apartado 267, Santiago, Cuba, under the name, American Salvage Products Corporation. Nicholas Colas will be in charge, working through the home office, 126 Broad Street, Elizabeth. Mr. Isaac on his return from a month's trip in Cuba reported that he found business conditions good.

The Service X-Ray Co., 222 Market Street, Newark, N. J., has been incorporated with a capital stock of $25,000 to manufacture x-ray machinery and parts. This company has been operating as a registered company for about 18 months and acts as a sales agent only. No manufacturing will be done unless it is in the remote future. Harry F. Ernest is president.

The Union Plane Co., New Britain, Conn., has been incorporated with a capital of $50,000 to manufacture planes, tools and hardware. It has acquired the business of the Union Mfg. Co., whose lines it will follow. The company is represented by H. H. Wheeler, 28 Forest Street, New Britain, Conn.

The Arundel-Shope Brick Co., Baltimore, Md., recently incorporated, has erected a plant which is now in operation. The company will manufacture concrete face brick. Richard A. Fishlinger is secretary-treasurer.

The Kilby Frog & Switch Co., Birmingham, Ala., was recently organized to take over a plant already in operation. The company will manufacture railroad crossings, frogs, switches and manganese track work. W. W. Stringfellow is president; E. M. and T. E. Kilby, vice-presidents, and H. W. Bostick, secretary.

The Sloan Bros. Co., 1302 Peoples Bank Building, Pittsburgh, has applied for a Pennsylvania charter to engage in the manufacture of power plant equipment and steam specialties. No immediate construction is being contemplated. P. M. Sloan is the chief incorporator.

The Gettman Motor Co., Union and Beale Avenues, Altoona, Pa., was recently organized to manufacture automotive equipment, but will do no manufacturing for the present. The company will act as agent for the Ford Motor Co. W. P. Gettman heads the company.

The Katchen-Shaw Iron Works, Newark, N. J., a newly formed corporation, has purchased land on Lyons Avenue, that city, and will erect a structural steel shop. Saul Shaw, the company's chief engineer, with offices at 298 Eighteenth Avenue, Newark, is preparing the plans, which provide a shop 80 x 140 ft. and a material yard.

The Caton Pipe & Fittings Co., Detroit, has been incorporated with a capital stock of $20,000 to manufacture pipe and engineering products, but no manufacturing will be done for the present. The company will operate chiefly as jobber of steel supplies. The incorporators are Louis N. Beers and Joseph R. Lee, Detroit, and Ross R. Caton, 331 Glengarry Avenue, Windsor, Ont.

R. P. Sweeny, Greenville, S. C., has organized to manufacture suction cleaners for use in industrial plants. Arrangements for manufacturing are completed. No building is contemplated at this time. R. P. Sweeny heads the company.

The Fresh Water Pump Co., Spartanburg, S. C., has been incorporated with a capital of $20,000 to manufacture pumping machinery, but for the present the company will act merely as selling agent. W. D. Burnett is president and treasurer, and L. S. Burnett, secretary.

The Rayner Auto Safe Lock Co., Louisville, Ky., has been organized to manufacture locking devices. Nothing definite has been decided as yet regarding plans for manufacturing. B. O. Keanny, 906 Inter-Southern Building, Louisville, Ky., is secretary.

The Heat Treated Parts Co., Third and Chestnut Streets, Harrisburg, Pa., has been incorporated with a capital stock of $350,000 to manufacture metal products. It has erected a plant and expects to start operation in January. Edward R. Sponsler is president; J. Herbert Freeland, secretary, and E. Curzon Fager, treasurer.

The P-D Auto Parts, Inc., 679 Colony Street, Meriden, Conn., was recently incorporated to act as distributor of valves, pistons, springs, axle shafts, etc. Charles J. Peterson is president.

Trade Changes

The Lamson Co., Inc., tubes, carriers and conveyors, has moved from 100 Boylston Street, Boston, to a new building at Syracuse, N. Y. Its plant, which was formerly located at Lowell, Mass., has also been removed to the new address.

The Herberts Machinery & Supply Co., Third and San Pedro Streets, Los Angeles, Cal., has been appointed exclusive representative of the Diamant Tool & Mfg. Co., Inc., Newark, N. J., to promote the sale of Diamant standard punch and die sets in California, Arizona and Nevada.

The United Shoe Machinery Corporation, Boston, has purchased the plant of the Haynes-Langenberg Mfg. Co., St. Louis, and will establish a branch factory there.

The Haynes-Langenberg Mfg. Co., St. Louis, manufacturer of steel furnaces, has purchased a tract of 22 acres on North Kingshighway, opposite Penrose Park, and will erect a new factory. The property has a frontage of approximately 1200 ft. on Kingshighway, and runs 850 ft. east to Euclid Avenue, extending to Bircher Street. The company will erect a three-story building, 150 x 200 ft., giving about twice the floor space available in the building now occupied at 4045-57 Forest Park Boulevard.

The Victor Tool Co., Waynesboro, Pa., has made the following changes in personnel: Edward T. Oliver has been appointed representative in Northern Ohio and will have his headquarters at 2031 Lincoln Avenue, Lakewood, Cleveland, and the J. F. Buhr Machine Tool Co., 7762 Dubois Street, Detroit, has been appointed representative in Eastern Michigan.

Ford S. Clark, formerly Chicago district representative of the Ralston Steel Car Co., has opened an office at 20 East Jackson Boulevard, Chicago, for the sale of railroad supplies.

The Witherow Steel Co., Pittsburgh, has opened a branch office in the General Motors Building, Detroit, in charge of J. S. Langston, district manager, assisted by L. A. Daines.

The E. S. Stacy Supply Co., 41-43 Taylor Street, Springfield, Mass., has been appointed agent for the South Bend Lathe Works, South Bend, Ind., in Hampden, Hampshire and Franklin counties.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipments in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	
Refined iron bars, base price	3.04c.
Swedish bars, base price	7.50c.
Soft steel bars, base price	3.04c.
Hoops, base price	4.39c.
Bands, base price	3.84c.
Beams and channels, angles and tees 3 in. x ¼ in. and larger, base	3.14c.
Channels, angles and tees under 3 in. x ¼ in., base	3.04c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger	3.10c.
(Smooth finish, 1 to 2½ x ¼ in. and larger)	3.30c.
Toe-calk, ½ x ⅜ in. and larger	4.15c.
Cold-rolled strip, soft and quarter hard	6.75c. to 7.25c.
Open-hearth spring steel	4.00c. to 6.00c.
Shafting and Screw Stock:	
Rounds	3.90c.
Squares, flats and hex	4.40c.
Standard cast steel, base price	15.00c.
Extra cast steel	18.00c.
Special cast steel	23.00c.

Tank Plates—Steel

¼ in. and heavier	3.14c.

Sheets

Blue Annealed

	Per Lb.
No. 10	4.19c.
No. 12	4.24c.
No. 14	4.29c.
No. 16	4.39c.

Box Annealed—Black

	Soft Steel C. R., One Pass, Per Lb.	Blued Stove Pipe Sheet Per Lb.
Nos. 18 to 20	4.30c. to 4.70c.	.....
Nos. 22 and 24	4.35c. to 4.75c.	5.00c.
No. 26	4.40c. to 4.80c.	5.05c.
No. 28	4.50c. to 4.90c.	5.15c.
No. 30	4.75c. to 5.15c.	.....

No. 28 and lighter, 36 in. wide, 10c. higher.

Galvanized

	Per Lb.
No. 14	4.60c. to 5.00c.
No. 16	4.75c. to 5.15c.
Nos. 18 and 20	4.90c. to 5.30c.
Nos. 22 and 24	5.05c. to 5.45c.
No. 26	5.20c. to 5.60c.
No. 27	5.35c. to 5.75c.
No. 28	5.50c. to 5.90c.
No. 30	6.00c. to 6.40c.

No. 28 and lighter, 36 in. wide, 20c. higher.

Welded Pipe

Standard Steel	Black	Galv.	*Wrought Iron*	Black	Galv.
½ in. Butt	—50	—42	½ in. Butt	—11	+13
¾ in. Butt	—55	—44	¾ in. Butt	—17	— 1
1-3 in. Butt	—57	—44	1-1½ in. Butt	—20	— 2
2½-6 in. Lap	—54	—41	2 in. Lap	—14	+ 2
⅞ in. Lap	—50	—26	2½-6 in. Lap	—18	— 2
9-12 in. Lap	—46	—25	7-12 in. Lap	—10	+ 6

Steel Wire

BASE PRICE* ON No. 9 GAGE AND COARSER	Per Lb.
Bright basic	4.75c. to 5.00c.
Annealed soft	4.75c. to 5.00c.
Galvanized annealed	5.40c. to 5.65c.
Coppered basic	5.40c. to 5.65c.
Tinned soft Bessemer	6.40c. to 6.65c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	19½c. to 20½c.
High brass wire	20 c. to 21 c.
Brass rod	17 c. to 18 c.
Brass tube, brazed	26⅜c. to 27⅜c.
Brass tube, seamless	23 c. to 23½c.
Copper tube, seamless	25¾c. to 26 c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 22c. to 23c. per lb. base.

Cold rolled, 14 oz. and heavier, 3c. per lb. advance over hot rolled.

Tin Plates

Bright Tin: Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20	Coke—14-20	Primes	Wasters
		80 lb.	$6.05	$5.80
		90 lb.	6.15	5.90
		100 lb.	6.25	6.00
IC	$10.00	$8.50	IC.. 6.40	6.15
IX	11.50	10.00	IX.. 7.40	7.15
IXX	13.00	11.25	IXX.. 8.40	8.15
IXXX	14.25	12.50	IXXX.. 9.40	9.15
IXXXX	16.00	14.00	IXXXX 10.40	10.15

Terne Plates

8-lb. coating, 14 x 20

100 lb.	$7.00
IC	7.25
IX	7.50
Fire door stock	9.00

Tin

Straits pig	40c.
Bar	45c. to 50c.

Copper

Lake ingot	15¼c.
Electrolytic	15 c.
Casting	14¾c.

Spelter and Sheet Zinc

Western spelter	8¾c.
Sheet zinc, No. 9 base, casks	10¼c. open 10¾c.

Lead and Solder*

American pig lead	8c. to 8¾c.
Bar lead	9c. to 10c.
Solder, ½ and ½ guaranteed	27½c.
No. 1 solder	26c.
Refined solder	23¼c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	75c.
Commercial grade, per lb.	35c.
Grade D, per lb.	25c.

Antimony

Asiatic	8c. to 8¾c.

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb. 25c. to 27c.

Old Metals

The market is more active and values slightly higher. Dealers' buying prices are as follows:

	Cents Per Lb.
Copper, heavy crucible	12.00
Copper, heavy wire	11.50
Copper, light and bottoms	9.50
Brass, heavy	6.50
Brass, light	5.50
Heavy machine composition	8.75
No. 1 yellow brass turnings	7.00
No. 1 red brass or composition turnings	8.00
Lead, heavy	5.75
Lead, tea	4.50
Zinc	4.50

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